GOVERNMENT OF SINDH

DAIRY
Sector Development Strategy – Sindh

2023-2027

The Dairy Sector Development Strategy is the official document of the Government of Sindh.

For any queries about the Sector Development Strategy, please contact the Department of Livestock and Fisheries.

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The Strategy was developed using the process, methodology and technical assistance of the International Trade Centre (ITC) within the framework of its Trade Development Strategies programme (https://www.intracen.org/trade-strategy/).

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The document benefited particularly from the inputs and guidance provided by Dr Nazeer Hussain Kalhoro, Director General, Livestock and Fisheries Department, Government of Sindh. Technical support was provided by Victor Deleplancque, Charles Roberge, Saadia Hanif, Rizwan Tariq and Saqib Ali.

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Note for the reader

The Dairy Sector Development Strategy, Sindh, was developed under the Growth for Rural Advancement and Sustainable Progress project, based on a participatory approach during which more than 30 industry leaders, small business owners and public sector representatives from the province held consultations to reach consensus on key sector competitiveness issues and priority activities.

Besides in-depth qualitative and quantitative research and value chain analysis, these consultations were complemented by visits and interviews. These were undertaken by the national consultants with provincial firms and institutions to guide the Strategy with insights and market intelligence as well as buyers' requirements in terms of quality standards, food safety, packaging, distribution channels, prices, etc.

The Dairy Sector Development Strategy builds on ongoing initiatives in livestock and private sector development and investment, and is aligned with the Sindh Livestock Policy. Equally important, the sector strategy initiative is complemented by an effort to establish the proper implementation responsibilities among key stakeholders early on to ensure timely implementation of activities, whether by the public sector, private sector or international development agencies. The principal output of this Strategy is an endorsed, coherent and comprehensive document with a five-year detailed Plan of Action (PoA) and implementation management frameworks.

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The Dairy Sector Development Strategy was developed under the aegis of the Department of Livestock and Fisheries, Government of Sindh, with financial assistance from the European Union, as part of the Growth for Rural Advancement and Sustainable Progress Project.

The document benefited particularly from the inputs and guidance provided by the members of the dairy industry sector team who steered the formulation of the sector strategy, as listed below.

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A complete list of public and private stakeholders that contributed their precious time to the design of this Strategy is detailed in Annex 1: Complete list of participants in the public–private consultations.

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Acronyms and abbreviations

Unless otherwise specified, all references to dollars ($) are to United States dollars, all references to tons are to metric tons, and all mentions of Departments refer to Departments of the Government of Sindh.

The following acronyms and abbreviations are used:

AHVS	Faculty of Animal Husbandry and Veterinary Sciences
AI	artificial insemination
AQD	Animal Quarantine Department
CCI	Chamber of Commerce and Industry
DCFA	Dairy and Cattle Farmers Association
DoASP	Department of Agriculture, Supply and Prices
DoIC	Department of Industries and Commerce
DoLF	Department of Livestock and Fisheries
FAO	Food and Agriculture Organization of the United Nations
FMD	foot and mouth disease
FY	fiscal year
GoS	Government of Sindh
ITC	International Trade Centre
LDC	Livestock Development Council
MNFSR	Ministry of National Food Security and Research
PCSIR	Pakistan Council of Scientific and Industrial Research
PDA	Pakistan Dairy Association
PKR	Pakistani rupee
PoA	Plan of Action
PPP	public–private partnership
PSQCA	Pakistan Standards and Quality Control Authority
R&D	research and development
SAU	Sindh Agriculture University
SBBUVAS	Shaheed Benazir Bhutto University of Veterinary and Animal Sciences
SEDF	Sindh Enterprise Development Fund
SEPA	Sindh Environmental Protection Agency
SFA	Sindh Food Authority
SIAH	Sindh Institute of Animal Health
SME	small and medium-sized enterprise
SPPRA	Sindh Public Procurement Regulatory Authority
SPU	semen production unit
TAD	transboundary animal disease
UHT	ultra-high-temperature

Executive summary

The Department of Livestock and Fisheries (DoLF) commissioned the design of the Dairy Sector Development Strategy. The Strategy forms an integral part of the Sindh Livestock Development Policy. This five-year strategy was defined through a consultative process between public and private sector stakeholders. The Strategy seeks to build a sustainable, competitive and integrated supply chain for the dairy sector in Sindh, focusing on enhancing the productivity and production of the industry and controlling livestock diseases. Importantly, the Strategy resolves to foster private sector-led development with the public sector, providing an enabling environment through policy interventions. Achieving this ambitious objective requires the active participation of the dairy sector, including monitoring progress and mobilizing resources to implement the PoA successfully.

The dairy sector is an invaluable source of nutrition and livelihood for millions of people in Sindh

Pakistan is one of the top milk-producing countries in the world, with a large dairy industry supporting the livelihoods of millions of small farmers and rural communities, including in Sindh, the second-largest province in milk production after Punjab. With an estimated 25.3 million heads of bovine animals, Sindh has the second-largest herd of bovine animals in Pakistan after Punjab (27%) (DoLF). The livestock sector is an essential contributor to the socioeconomic development of the province, providing livelihoods, nutrition and economic benefits to the population, and providing substantial revenue to 2.4 million households involved in the livestock sector that are primarily engaged in subsistence livestock production in rural areas.

The predominance of the rural subsistence production system results in a limited marketable surplus of milk. To a large extent, this mostly informal and poorly organized production system still relies on traditional farming practices, with little awareness and knowledge about animal health and nutritional requirements resulting in meagre per-animal yield and an overall supply of milk that could be more effective and consistent. Milk production in Sindh is very much linked to water and green fodder availability, and is therefore subject to severe seasonal fluctuations and shortages. The milk produced by these smallholders is primarily consumed at source within the village, with a minimal tradable surplus.

Several limiting factors along the value chain are impeding its growth

Several bottlenecks and challenges must be addressed if the local dairy sector is to increase production, develop value-added dairy products and generate substantial export revenues. Several factors limit the production and productivity of the dairy sector in Sindh; chief among these are the challenges farmers face in accessing quality inputs such as high-yielding livestock breeds, improved feed and veterinary services. The availability and affordability of these inputs deeply affect the productivity and health of dairy animals. The limited technical knowledge and training among farmers regarding modern dairy farming practices, animal health management and fodder production also hinder productivity. The high volumes of unhygienic milk that reach urban consumers is another major concern, and is often the result of poor farming practices, lack of awareness among farmers and consumers, and inadequate milk processing and handling practices.

Addressing these limitations requires investments in infrastructure development, research and extension services, and training programmes; and improved access to finance. Collaborative efforts from government institutions, private sector stakeholders and development organizations can help overcome these challenges and enhance the production and productivity of the dairy sector in Sindh. Developing a regulatory landscape more conducive to private sector development will spur sector development, attract investment and improve quality.

The strategic framework

To achieve the development of the dairy sector in Sindh, the present strategy provides a roadmap and a PoA geared at achieving the following overall vision:

> ***'To build a sustainable, quality-driven and profitable dairy sector in Sindh, leveraging modern farming practices and the genetic improvement of dairy animals.'***

This vision statement, agreed upon by all dairy value chain stakeholders in Sindh, delineates this Strategy's proposed vision and strategic objectives. The Strategy's PoA responds to this vision by comprehensively addressing the sector's constraints and leveraging opportunities. To achieve this, specific efforts will be made in the following strategic directions.

The strategic objectives

Strategic objective 1 **Foster animal disease prevention and private sector development, supported by informed regulatory decision-making**	• 1.1. Harmonize and strengthen the legal and regulatory framework, making it conducive for private sector development • 1.2. Foster efficient management and control of transboundary animal diseases and improve livestock traceability • 1.3. Ensure the availability of reliable livestock data across the value chain
Strategic objective 2 **Enhance milk production through increased productivity**	• 2.1. Optimize the genetic potential of dairy animals • 2.2. Promote better nutrition for dairy animals • 2.3. Improve dairy farm management and promote sustainable practices
Strategic objective 3 **Ensure the production of safe and high-quality milk and promote value addition**	• 3.1. Improve food safety and quality management along the supply chain • 3.2. Optimize the milk supply chain and enhance market links • 3.3. Support the production and marketing of value-added dairy products

First, the Strategy aims to refocus policies and institutions towards animal disease prevention and private sector development. Consistent with the Sindh Livestock Policy, the Dairy Sector Development Strategy emphasizes the Government of Sindh (GoS) as a regulator, focusing on creating a regulatory framework conducive to private sector development and supporting investment, notably by revising the mechanisms in place for the fixation of milk prices by local government. A first set of actions have been designed to manage and control transboundary animal diseases (TADs) efficiently, through establishing disease-free compartments and zones, and producing and distributing vaccines and medication in the province while developing animal registration and traceability systems. These efforts should be supported by collecting up-to-date, empirical data to facilitate evidence-based decision-making and planning, identify areas for improvement, and promote transparency and accountability in the dairy sector.

Second, the Strategy focuses on increasing the productivity and profitability of livestock production, particularly enhancing per-unit animal yield by improving veterinary health coverage, husbandry practices, animal breeding practices, artificial insemination (AI) services, and production and use of improved locally produced feed and fodder. The Strategy also aims to establish modern commercial dairy farms fostering green energy solutions and reducing the impact on the environment of these farms' operations.

Last, the Strategy seeks to encourage value addition and enhance market links while ensuring safe milk production for the population. Enhancing food safety and quality management systems in the dairy sector in line with international best practices is a priority need. This will improve hygiene and sanitation practices in the domestic market, enhance consumer confidence, promote exports and safeguard public health. Efforts will also be mobilized to support small and medium-sized dairy farms in processing value-added dairy products, improve the milk collection system and better connect farms to the market, primarily through the development of cooperative societies and associations.

Against this backdrop, the Sindh Dairy Sector Development Strategy is geared towards enhancing the competitiveness and sustainability of the dairy sector in Sindh and promoting the economic and social development of rural communities dependent on dairy farming. Strengthening dairy production systems, including commercial and subsistence farmers and their supply chains, thereby represents a powerful engine for economic growth, poverty reduction and employment, particularly among rural communities. By promoting the dairy sector, the government can increase the availability of nutritious food for the local population, improving their health and wellbeing. Given the essential role of women in the dairy sector in Sindh (women are primarily responsible for the management of small-scale dairy farms), promoting gender mainstreaming will also ensure increased participation and revenue for women in the sector.

Implementation management

The Strategy considered current abilities, constraints, future shifts and opportunities for Sindh's dairy sector. It presents a pragmatic and forward-looking roadmap for upgrading and internationalization, and it can be driven successfully through timely and appropriate resource allocation and effective public–private collaboration for implementation.

Accordingly, a Livestock Development Council (LDC) and a subcommittee dedicated to the dairy sector in Sindh will be established, operationalized and empowered. The subcommittee will be responsible for overall coordination, provision of rapid and viable solutions to regulatory and procedural bottlenecks, policy guidance and monitoring industry development against the Strategy's objectives.

The dairy sector in Sindh

As per the Sindh Local Government Act*, 'dairy' includes any farm, cattle shed, cow house, milk shop, milk store, or other place where milk products are supplied for sale.*

This section provides an overview of the current state of the dairy sector in Sindh and highlights the most significant segments and trends of domestic and export markets.

The dairy sector is of particular importance for economic growth, food security and poverty alleviation in Sindh

Animal husbandry plays an important role in the economy of Pakistan, given that it is a country whose industry it largely rural and agriculture-based. More than eight million rural families are estimated to be engaged in livestock production throughout the country. Most rural households keep a buffalo, a cow or a goat, which are primarily raised for milk production. These households derive an estimated 35% to 40% of their income from this source (Government of Pakistan, Finance Division, 2022). Looking more specifically at the dairy sector in Sindh, the 2006 Livestock Census – though largely outdated – provides an insight into the importance of the sector. It reported 1.7 million dairying households, most of whom own between one and four milch cows or buffaloes. The sector is also of significant importance for women because they are involved in major management activities such as feeding, watering and housing, while men are involved in marketing.

The livestock sector contributes significantly to the national economy of Pakistan. Livestock is the most important contributor to value added in national agriculture. In fiscal year (FY) 2021/22, the sector contributed about 62% of the entire agricultural economy and 14% of the overall country's gross domestic product (Government of Pakistan, Finance Division, 2022). At the national level, livestock achieved growth of 3.3% year-over-year in 2021/22, with gross value addition reaching PKR 5,441 billion at constant basic prices of 2015/16 (Pakistan Bureau of Statistics). At current prices, the contribution is about PKR 6,661 billion.

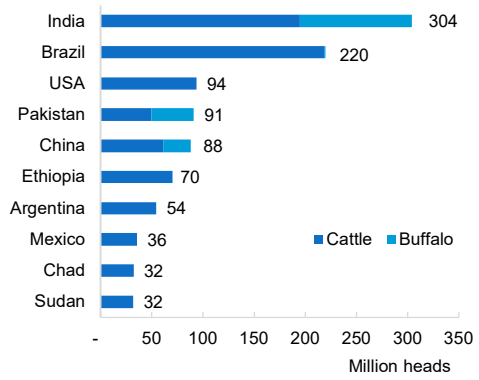
In Sindh, where agriculture is a major industry, the dairy sector plays a vital role in providing nutritional benefits to the population. Dairy products such as milk, yoghurt and cheese are rich sources of nutrients such as calcium, protein and vitamins, which are essential for a healthy diet. Driven by population growth, urbanization and rising per capita income, domestic demand for these products constantly increases.

Sindh is endowed with a large production base

Pakistan is endowed with one of the largest populations of major dairy animals in the world (i.e. cattle and buffaloes). Based on the inter-census growth rate from the Livestock Censuses of 1996 and 2006, the estimated national bovine animal population was 97.1 million heads – comprising cattle (55%) and buffaloes (45%) – for FY 2021/22 (Ministry of National Food Security and Research (MNFSR)). This means Pakistan has the fourth largest bovine animal inventory in the world after India, Brazil and the United States of America (see Figure 1) (Food and Agriculture Organization of the United Nations (FAO), 2020). In Sindh, the population of bovine animals was estimated at 25.3 million heads in 2019/20, or about 27% of the national herd, second only to Punjab.

These figures should, however, be looked at with caution because the estimated livestock population is determined by applying a fixed growth rate to the projected population of each year at both the federal and provincial levels, using the inter-census growth rate between the 1996 and the 2006 Livestock Census. By way of comparison, the 2006 Livestock Census estimated the bovine animal population of Sindh at 14.3 million.

Figure 1: Top 10 countries in terms of bovine animal population, 2020 (million heads)



Source: ITC calculations based on FAOSTAT data (www.fao.org/faostat/en/).

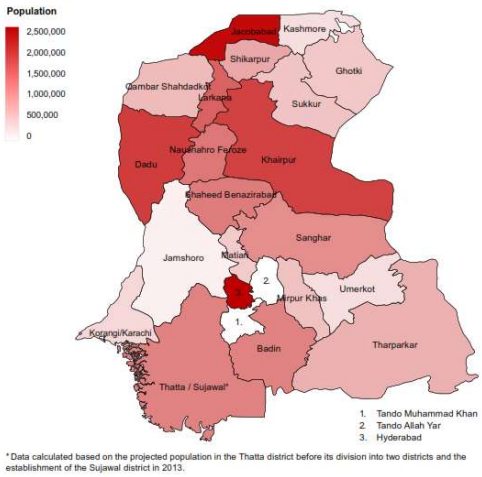
Table 1: Bovine animal population in Sindh (projected)

	2019 (million heads)
Cattle	12.6
Buffalo	12.8
Total	**25.3**

Source: DoLF.

The bovine animal population is scattered across the different districts of Sindh with a relatively low degree of concentration. Figure 2 presents the main districts in terms of bovine animal population, which include Hyderabad, Jacobabad, Dadu, Khairpur and Larkana, to name a few. A rapid expansion of the peri-urban population of cattle has also been observed in recent years. This has occurred to supply urban consumers, motivated by the rapid and steady growth of the urban population across the country.

Figure 2: District-wise population of bovine animals in Sindh, 2019 (projected)



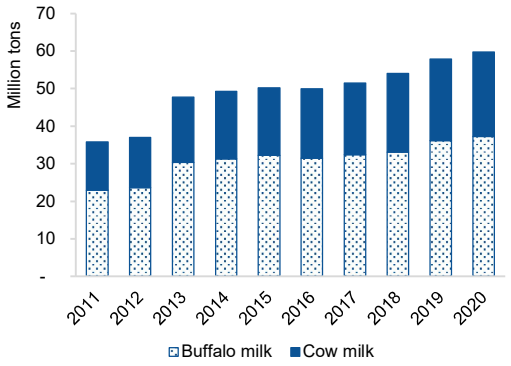
Source: ITC calculations based on data from DoLF.

With an estimated production of fresh whole cow and buffalo milk of 15 million tons in FY 2021/22, or about 23% of the national production of 63.7 million tons,[1] international comparisons position Pakistan as the third-largest milk producer in the world, after India and the United States (based on 2020 FAO data) (see Figure 4). Unlike most large milk producers, this production consists primarily of buffalo milk (62%) (MNFSR). There is also a negligible proportion of goat, sheep and camel milk (see Table 2).

As for the estimated bovine animal population, these figures should be looked at with caution because the estimated milk production is not based on empirical evidence but calculated by applying milk production parameters to the projected bovine population based on the inter-census growth rate of the Livestock Censuses of 1996 and 2006 (Government of Pakistan, Finance Division, 2022).

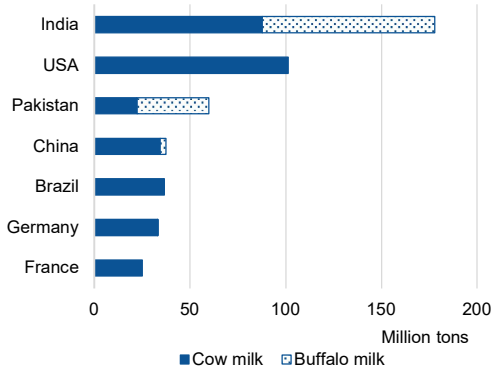
[1] Calculated based on data from Government of Pakistan, Finance Division (2022).

Figure 3: Pakistan's production of fresh whole milk, 2011–2021 (millions of tons)



Source: ITC calculations based on FAOSTAT data (www.fao.org/faostat/en/).

Figure 4: Main producers of fresh cow and buffalo milk, 2020 (millions of tons)



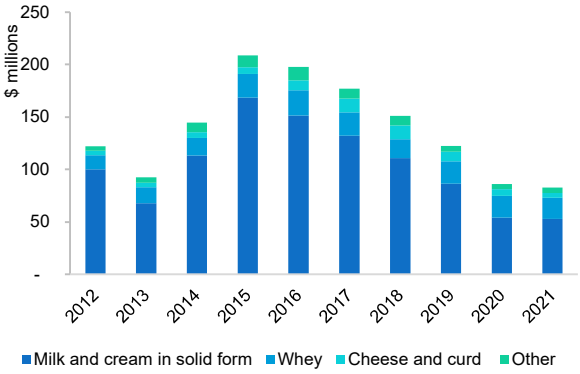
Source: ITC calculations based on FAOSTAT data (www.fao.org/faostat/en/).

Table 2: Estimated milk production in Pakistan (gross production), FY 2021/22 (thousands of tons)

Livestock types	Volume (000 tons)
Cow	24 238
Buffalo	39 503
Sheep	42
Goat	1 018
Camel	944
Milk (gross production)	**65 745**

Note: The figures are calculated by applying milk production parameters to the projected population of respective years based on the inter-census growth rate of Livestock Census 1996 and 2006.
Source: MNFSR.

Figure 5: Pakistan imports of dairy products, 2012–2021, in value ($ millions)



Source: ITC calculations based on United Nations Comtrade data (https://comtradeplus.un.org/).

Milk production in the province is subject to severe seasonal fluctuations and shortages

Due to the predominance of the rural subsistence production system in Sindh, milk production is closely linked to the availability of water and green fodder. Consequently, production is at its peak during the flush season in winter, between December and April, and decreases during the lean season in summer, between May and August. The drop in production can be as low as 55% of the peak production (de Jong, 2013). Because the demand for milk and dairy products such as lassi, yoghurt and ice cream is significantly higher during the summer months – when production is at its lowest – periodical shortages occur. Conversely, milk consumption is low during the winter season, when production peaks.

Another important factor to consider is that only an estimated 50% of the milk production is tradable and reaches the market, while the other half is consumed at source by rural subsistence farmers. This highlights the need to strengthen and further develop market links, improving the participation of rural smallholders in the supply chain.

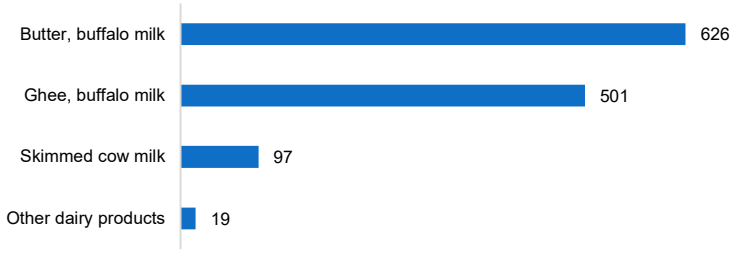
These periodic deficiencies in the domestic milk supply force dairy companies to import large quantities of dry milk products, which is a burden on the economy of Pakistan. In 2021, Pakistan imported $82.8 million worth of dairy products, 64% of which consisted of powdered milk and cream, or about $53 million worth (https://comtradeplus.un.org/). Imports of whey are also significant, accounting for about 24% of the country's total dairy products imports. The imported value of milk and milk products could even be as high as $146.2 million for FY 2020/21 (Pakistan Bureau of Statistics). The demand–supply gap is also partially bridged through the sale of adulterated milk by informal market players to increase volume.

The processing of value-added dairy products remains limited, particularly for small dairy farmers

In Sindh, milk is primarily consumed as raw or 'open' milk. The dairy processing industry is relatively underdeveloped: a mere 3% to 5% of the milk produced is estimated to be processed into dairy products. Nevertheless, several large-scale milk processing plants operate in the province, chiefly FrieslandCampina Engro Pakistan Ltd and Nestle Pakistan Ltd, as well as many small-scale producers and processors in the traditional system, though mainly in a disorganized and unhygienic way.

The milk processed in the province consists mainly of pasteurized and ultra-high-temperature (UHT)-treated milk, which provides a longer shelf life. Dairy processors also manufacture value-added products such as butter and ghee, powdered milk (whole and skimmed), cream, yoghurt, cheese, ice creams, lassi and whey. Milk processing operations are presented in more detail in the value chain analysis and competitiveness diagnostic section of the Strategy.

Figure 6: Pakistan's production of processed dairy products (million tons)



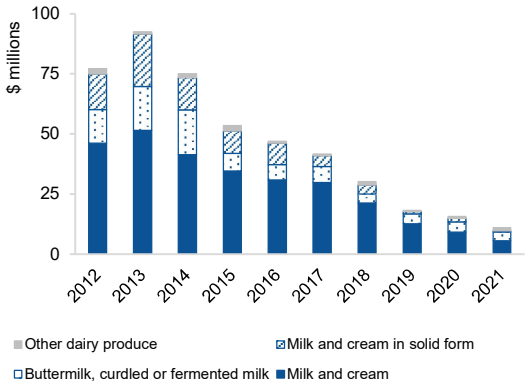
Source: ITC calculations based on FAOSTAT data (www.fao.org/faostat/en/).

The dairy sector is yet to penetrate international markets

Export revenues generated by the dairy industry are limited

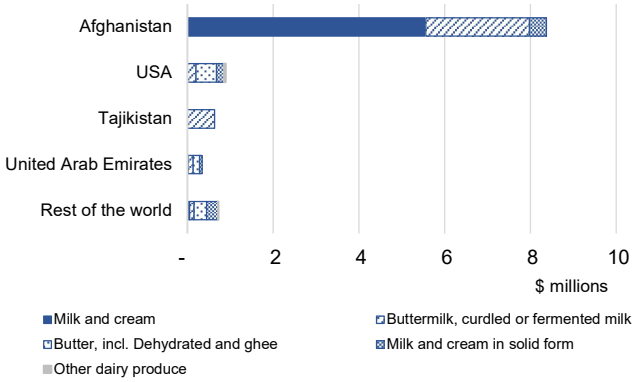
Mainly geared towards the domestic market, Pakistan's exports of dairy products are minimal, only amounting to about $11 million in 2021 (https://comtradeplus.un.org/)***.*** Export revenues generated by the dairy industry divided almost threefold over the period 2017–2021, declining at a compound annual growth rate of almost 28%.

Figure 7: Pakistan exports of dairy products, in value, 2012–2021 ($ millions)



Source: ITC calculations based on United Nations Comtrade data (https://comtradeplus.un.org/).

Figure 8: Pakistan exports of dairy products, by destination, 2021 ($ millions)



Source: ITC calculations based on United Nations Comtrade data (https://comtradeplus.un.org/).

Pakistan dairy exports are largely concentrated in the milk segment, mainly sold to Afghanistan

Pakistan's primary exports of dairy products are in the form of milk and cream, not concentrated and not containing added sugar or other sweetening matter. In 2021, this category of products accounted for about 51% of Pakistan's total exports of dairy,[2] 55% of which consisted of milk with a fat content by weight of more than 1% but less than or equal to 6%. Other export products include buttermilk, curdled or fermented milk (32%), dehydrated butter and ghee (7%), and milk and cream in solid form (5%). This indicates the low level of processing of the sector's export basket.

Despite a sharp drop in 2021, Afghanistan remains the largest trading partner of Pakistan's dairy produce exporters. In 2021, Afghanistan captured 76% of Pakistan's total dairy products exports, or in excess of $8.4 million, the bulk of the transactions consisting of milk (66%) and buttermilk, and curdled or fermented milk (29%) (https://comtradeplus.un.org/). Afghanistan accounts for virtually all of Pakistan's exports of milk and cream (categorized under the Harmonized System code 0401) (99%), and 69% of the country's exports of buttermilk and curdled or fermented milk (https://comtradeplus.un.org/).

The transition towards a more diversified product mix with higher value addition destined for a larger number of international markets must be improved by addressing several bottlenecks and issues along the value chain.

Box 1: The dairy sector in Sindh – Key takeaways

- The livestock sector is an essential contributor to the socioeconomic development of Sindh, providing livelihoods, nutrition and economic benefits to the population, notably providing substantial revenue to rural households engaged in subsistence livestock production.
- The veracity of livestock population and dairy production estimates is contested. Access to reliable and up-to-date livestock data at the provincial level is a priority for proper planning and the formulation, implementation and monitoring of any programme aimed at developing the sector.
- Milk production in Sindh is characterized by low per-animal yield.
- The local dairy industry is mainly geared towards the domestic market, with extremely limited export revenues generated from sales to Afghanistan.
- There is export potential and huge untapped potential for value addition to livestock and dairy products.
- The sector's structure, the animals' characteristics, how animals are being kept and how milk is being collected and marketed have a significant bearing on the dairy industry's performance and productivity.

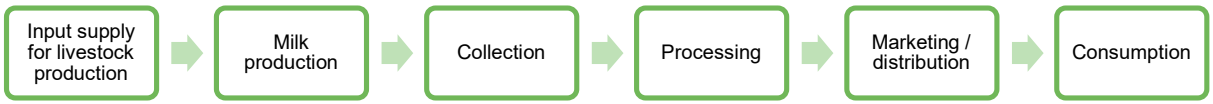
[2] Considering products classified under the Harmonized System code 0401 'Milk and cream, not concentrated nor containing added sugar or other sweetening matter'.

Value chain analysis and competitiveness diagnostic

The value chain diagnostic outlines the operations of the dairy sector in Sindh following a 'from farm to fork' approach. The analysis aims at investigating the sector's competitiveness, identifying bottlenecks and challenges, and defining opportunities for strategic planning.

The value chain mapping for the dairy sector in Sindh is broadly classified below into the main stages shown in Figure 9, which are described in more detail in this section.

Figure 9: Simplified dairy value chain



Source: ITC.

A production system dominated by small subsistence farmers

Analysing and understanding the different stages and operations of the dairy sector value chain in Sindh is only possible when considering the coexistence of different production systems, each with its specificities and requiring separate value chain analysis, as presented in this section. The livestock breeding and rearing systems that prevail in cattle production in Sindh can be analysed through three different segments: the rural subsistence production system, rural market-oriented small and medium-sized farms, and peri-urban and urban commercial large farming.

1. **Rural subsistence production system**

Most dairy farming communities are still trapped in low-input / low-output agricultural practices, barely above subsistence level. Under the rural subsistence production system that prevails in Sindh, livestock is primarily reared by smallholders scattered across rural areas of Sindh keeping an average of three to five animals. To a large extent, this mostly informal production system still relies on traditional farming practices with little awareness and knowledge about animal health and nutritional requirements, resulting in very low yield and an overall supply of milk that is neither consistent nor efficient. Under this production system, animals are primarily fed on grown fodders, and holdings have limited access to veterinary services and AI.

As mentioned earlier, a significant proportion of the milk produced in rural areas is consumed at source within the village, either through household consumption or direct sales to the neighbourhood. The remainder, about 30%–40%, is marketed, mainly through collection agents known as '*dhodhis*' (Zia, 2007). Various estimates indicate that this production system accounts for about 65% of fresh milk produced in Pakistan.[3] Because livestock is primarily kept for milk production, farmers prefer rearing heifers to male calves, which are generally considered a liability to the farmer and are usually sold and culled for meat at a young age.

Though largely outdated, the 2006 Livestock Census provides an insight into the herd size by household in Sindh and confirms the prevalence of small subsistence farmers, indicating that more than 73% of the 1.7 million reported dairying households owned between one and four milch cows or buffaloes. An additional 22% maintained herd sizes of 5–10 animals (see Table 3).

2. **Rural market-oriented small and medium-sized farms**

This segment consists of holdings maintaining an average of above five – and up to 50 – animals, and using improved basic husbandry practices and management practices, allowing farmers to produce tradable surplus milk with better yields. Most of these farmers also adopt appropriate breeding techniques, including AI. This production system has better links with the consumer market, with commercial ties to milk collection and processing companies.

Recent years have seen an increase in these farms in Sindh as the milk processors have expanded their milk connection network in rural Sindh. Different development projects undertaken by international donor agencies to improve the dairy value chain in rural Sindh have also contributed to the development of market-oriented

[3] ITC calculations based on data from Pakistan Bureau of Statistics, 2006.

dairy farms. It is estimated that these farms contribute between 10% and 15% to the production system and overall milk sourcing in Pakistan. In Sindh, about half of the milch animals are kept in rural market-oriented small and medium-sized farms.[4]

3. **Peri-urban and urban commercial large farming**

These holdings are very small in number and may keep up to 2,500 animals in their herd, mostly concentrated in the Landhi Cattle Colony in Karachi and the cattle colony of Hyderabad. Cattle colonies are indispensable suppliers of milk, meat and other dairy products to many urban consumers, particularly in Karachi, Hyderabad, Sukkur and Larkana.

This system maintains effective market links and breeds the animals on modern lines. These farms are also better equipped with technological requirements and maintain a trained workforce, including veterinary staff for immediate and appropriate care of the animals. This results in higher productivity for dairy and meat animals. Due to higher management costs, only high-yielding animals are retained while calves and dry females are sold, generally for slaughtering.

Large-scale, state-of-the-art corporate dairy farms were also developed recently with imported high-genetic cattle and direct links to major dairy product processors. These farms manage from 1,000 to 5,000 milking cows with the technical support of foreign consultants and suppliers. These farms are generally competitive in milk production, with links to the market and value-added products.

Unofficial sources estimate that peri-urban producers account for about 15% of total milk production and urban producers account for 5%.

Table 3: Herd size by household in Sindh, milch cows / buffaloes

Herd size	Households	Ownership by household (%)	Number of animals	Share in total milch animals (%)
1–2	809 337	48.6	1 205 512	17.2
3–4	414 750	24.9	1 416 114	20.2
5–6	203 533	12.2	1 102 627	15.8
7–10	157 828	9.5	1 291 533	18.5
11–15	47 520	2.9	595 973	8.5
16–20	13 438	0.8	240 051	3.4
21–30	8 166	0.5	205 132	2.9
31–51	5 207	0.3	197 742	2.8
51+	4 879	0.3	743 632	10.6
Total	**1 664 657**	**100.0**	**6 998 319**	**100.0**

Source: ITC calculations based on data from Pakistan Bureau of Statistics (2006).

Genetics, access to feed, and health and veterinary services have a considerable bearing on milk production and productivity

Upstream activities of the dairy value chain concern animal husbandry and the inputs needed to keep livestock. Inputs include productive animals for dairy purposes (genetics), vaccines and veterinary medicines, feed, fodder seed, silage / hay and farm machinery.

Animal types and genetics

Indigenous breeds in Sindh are generally either milk breeds (genetically developed for higher milk production) or dual purpose at best, meaning they are specialized for neither meat nor milk. The main cow breeds in Sindh are the Red Sindhi and the Thari, accounting for 38% and 23%, respectively, of the total bovine animal population of the province (Pakistan Bureau of Statistics, 2006). The buffalo population is dominated by the Kundhi breed, which accounts for 72% of the total, followed by Nili-Ravi. Driven by the development of commercial dairy farms, the population of nondescript and crossbred animals has been increasing in recent

[4] ITC calculations based on data from Pakistan Bureau of Statistic (2006).

years due to their higher production (mostly local cows like Red Sindhi with imported cows like Holstein Friesian and Jersey).

- In small subsistence farming, breeds of animals are not well managed. Inadequate inbreeding and cross-breeding practices, coupled with poor nutrition, result in low average dairy yields of two to three litres per animal per day (Rizwana et al., 2017).
- In the rural commercial system, the animals are more diversified genetically; a commercial farmer usually keeps a mix of exotic cross-bred animals together with Red Sindhi, Nili Ravi or Kundhi buffaloes. Recent interventions by development projects and milk processors have led farmers to invest in importing more productive animals from the United States, Australia and other destinations renowned for high-producing animals.
- Peri-urban farms mostly keep high-producing buffaloes from Punjab, with a higher average daily milk production of 8–12 litres per animal.
- Large corporate farms, on the other hand, keep herds consisting exclusively of highly productive imported genetics of Holstein Friesian.

Feed and fodder

Animal feed accounts for a significant portion of the total input costs in dairy farming, with estimates suggesting that up to 60% of the costs for cattle and 80% for buffaloes are related to feed. At the national level, more than half of animal feed comes from fodders and crop residues, one-third from grazing of rangelands, wastelands, canal banks and roadsides, and the rest is from crops and their by-products (see Table 4).

Table 4: Availability of fodder in Pakistan, FY 2020/21

Fodder	Availability (%)
Green fodder and crop residues	51
Forage grazing	38
Postharvest grazing	3
Concentrates from crop residues	2
By-products (molasses, sugarcane tops, vegetables)	6
Total	**100**

Source: Government of Pakistan, Finance Division (2022).

Despite being the primary and cheapest source of feed, fodder crops barely meet half of the maintenance requirements of the present livestock population. The supply is notably disrupted by critical fodder scarcity periods in winter (November to January) and summer (May to June). Harvested fodder area decreases by about 2% each decade, further worsening the situation.

Taking this into consideration, animal nutrition and feeding patterns largely vary depending on the different production systems, as described below.

- Small rural farmers often rely on green fodder for their livestock, including all crops cut and carried for feed. These farmers typically rely on wheat straw, crop residues and marginal lands for grazing, as they are often landless and unable to grow fodder themselves. The high cost of silage and concentrates, coupled with seasonal shortages of green fodder, make it difficult for small farms with limited financial resources to access high-quality feed inputs. This challenges smallholders looking to raise healthy livestock and maintain profitable operations.
- In contrast, rural commercial farmers can grow or purchase green fodder for their livestock, at times also using commercial feed to supplement their animals' diets. Increased access to high-quality feed inputs can help support the health and productivity of their livestock.
- Peri-urban, large-scale livestock farms often supplement green fodder with concentrates, crop residues and other agro-industrial by-products in their animal feed. These farmers typically rely on their formulas for feed formulation and do not usually include silage and hay in their feed, instead commonly using a mixed straw with crop residues.
- Large dairy corporate farms, on the other hand, may purchase fodder, silage and hay and have nutritionists who formulate feed formulas based on the nutritional requirements of their cows.

Breeding and veterinary services

As mentioned above, indigenous breeds are typically milk breeds or dual-purpose breeds at best. While genetic improvement through AI is considered an effective method to increase the number of high-yielding breeds, this practice is not widespread and is mainly accessible to large commercial farms. Veterinary and breeding services are generally limited to peri-urban, market-oriented farmers due to fragmented rural production systems, low levels of education among rural farmers, and costs that are often too high for smallholders.

Historically, peri-urban farmers have not been involved in breeding buffaloes, instead selling dry buffaloes to butchers or sending them to rural areas, resulting in a significant loss of genetic resources. Breeding buffaloes is, however, becoming more common.

Most of the fresh milk produced in Sindh is consumed at source

Various sources estimate that over 90% of the milk produced in Pakistan is subsistence-based and typically sold through informal channels, usually directly to rural consumers. The fresh milk produced by subsistence farmers not consumed at source is mainly marketed through small local middlemen (*katcha dhodhis*) who collect milk from individual farmers and then sell it on to *pakka dhodhis*, who supply retailers and street sellers (*gawalas*) in towns and cities.

In Sindh, milk is primarily consumed as raw or 'open' milk. In addition to facilitating the collection process 'at the doorstep', *dhodhis* also play an essential socioeconomic role because they provide immediate financing and liquidity to rural households at the time of purchase from the farmers. They often have social and family links to the milk farmers and enjoy more trust and family bonds. Besides being supplied directly to consumers, excess milk is sold to other market players, including shopkeepers, *khoya* makers, confectioners / bakers, *dhodhis* or milk collection centres of processing plants (de Jong, 2013).

Peri-urban farms sell their milk directly to urban consumers or *dhodhis*. They may also have their own shops or sell milk door to door to urban consumers.

Milk for processing is mostly collected through milk collection centres set up by large corporate milk processors – chiefly FrieslandCampina Engro Pakistan and Nestle – at the village level and equipped with basic infrastructure, including chillers. A share of the milk intended for processing is also collected from dairy farms or individual milk producers. After testing, the milk is collected and transported to sub-centres and processing plants in refrigerated carriers. This system allows rural farmers to obtain better prices. These firms play a vital role in structuring local supply chains while contributing to the economic development of rural communities.

The dairy processing industry is relatively underdeveloped and dominated by large multinational companies

In Sindh, processing activities are mostly carried out through two distinct channels: large-scale milk processing plants; and small-scale producers and processors.

Several large-scale milk processing plants operate in the province. These companies have implemented modern technology and equipment to ensure high-quality products and maintain the highest food safety and quality per international standards. Some of the major milk processing plants operating in Sindh include:

- FrieslandCampina Engro Pakistan Ltd
- Nestle Pakistan Ltd
- Haleeb Foods Ltd
- Fauji Foods Ltd
- Millac Foods Pvt. Ltd
- Dairyland Pvt. Ltd
- Shakarganj Food Products Ltd
- Anhaar Milk Products (Pvt) Ltd
- Everfresh Farms Pvt. Ltd

The milk is primarily processed into pasteurized and UHT-treated milk (packaged milk), providing up to six months of shelf life. The process generally includes the following stages:

- **Milk reception:** The collected milk is tested for quality, temperature and composition, and is filtered to remove impurities.

- **Standardization:** The milk is then standardized to achieve a uniform fat and solids-not-fat composition.
- **Pasteurization:** The standardized milk is heated to a high temperature to kill harmful microorganisms.
- **Homogenization:** The milk is then homogenized to break down the fat globules and distribute them evenly throughout the milk.
- **Packaging:** The milk is packaged in various containers such as bottles, cartons or bags.
- **Quality control:** The final product is subjected to quality control tests to meet the required standards.

In addition to pasteurized and UHT milk, some companies process milk into other dairy products through various treatments, including flavoured UHT milk, yoghurt, cheese, butter and ghee, lassi, powdered milk (whole and skimmed) and ice cream.

Importantly, these multinational companies – notably FrieslandCampina Engro Pakistan Ltd. and Nestle Pakistan Ltd. – also play a crucial role in the economic development of rural communities by providing training and support to small-scale milk producers and processors to improve the quality of their products.

Many small-scale producers and processors in the traditional system also carry out dairy processing activities but mainly in a disorganized and unhygienic way (de Jong, 2013). Tremendous opportunities exist to support and train local farming communities in the processing and marketing of value-added dairy products including, but not limited to, skimmed beverages, yoghurt, ice cream, cheese, milkshakes, butter, evaporated milk, condensed milk, *khoya*, whey and butter oil (ghee). However, it is difficult to accurately assess the estimated installed processing capacity in the province due to the lack of available data on the number of milk processing units and the volume of fresh buffalo and cow milk processed.

The dairy industry is primarily catering to the domestic market

The final stage in the value chain involves distribution, product placement, branding and packaging, and policy initiatives to open new markets and enhance market share.

Most of the milk produced in Sindh is consumed fresh at source by rural communities or transported to urban centres, mostly through *dhodhis*. The average middle-class or lower middle-class consumer in the province prefers to buy open milk. Open milk is preferred because of the perception that it is fresher, richer and more natural, as many consumers believe that milk in sealed packages may contain preservatives or other additives that could be harmful to their health. The price of open milk is also lower than packaged milk, making it more affordable for many consumers.

On the other hand, packaged milk is usually preferred by urban consumers with a modern lifestyle where they do not have time to buy milk, boil it, preserve it, etc. UHT milk is preferred to pasteurized milk due to its higher shelf life.

Fresh milk can also be sold by dairy farms to dairy shops directly. These shops can be a franchise of famous brands or small retail shops in the area, selling milk in the evening and morning.

As indicated earlier, only a negligible share of Pakistan's dairy production is destined for the international markets. Most processed products are sold to local markets through retailers or informal markets.

Value chain mapping

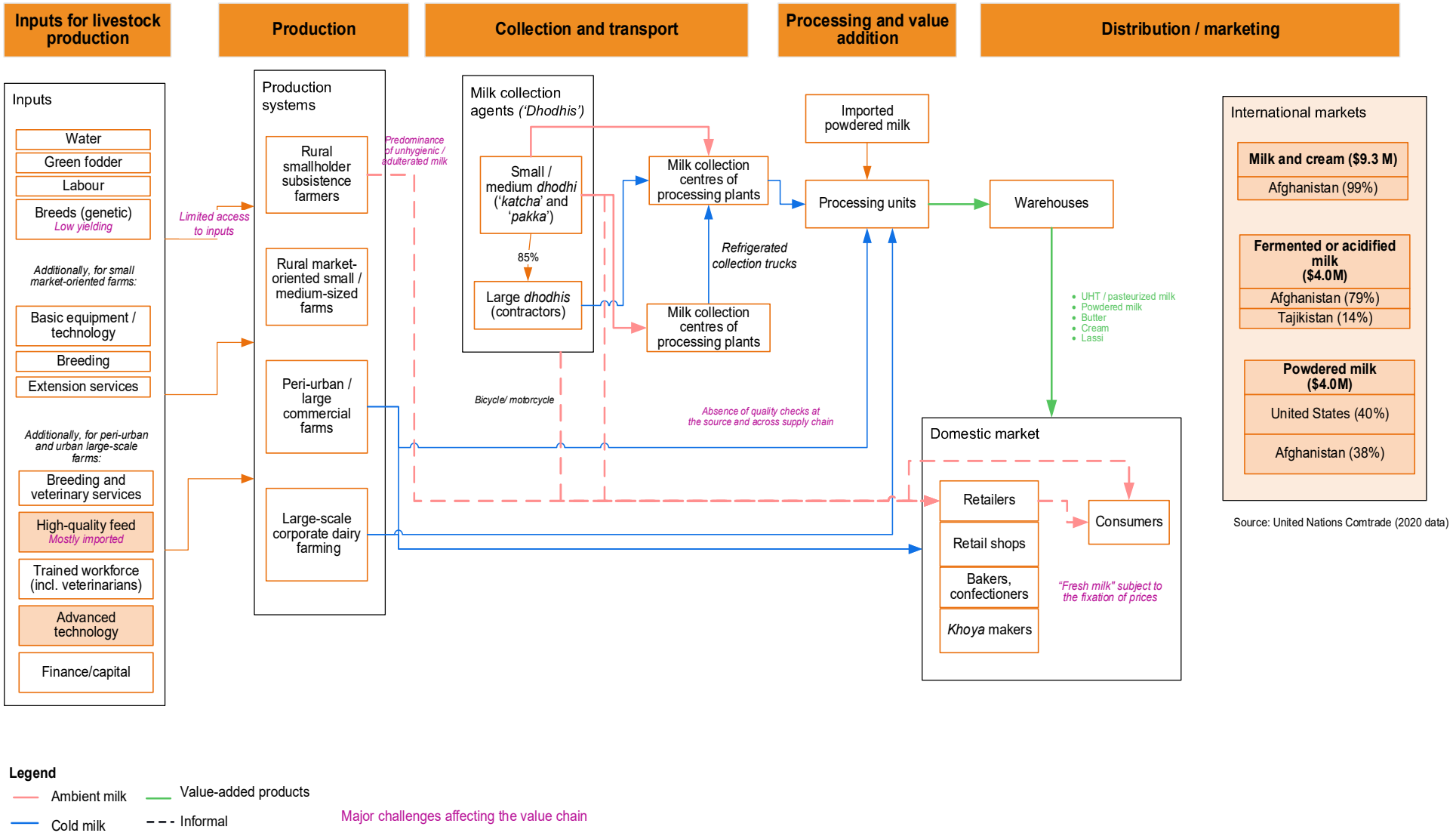
A value chain map is a visual representation of all the transformation processes and supporting services required to move a product or service from conception to delivery and the final consumer.

A value chain map:

- Is a visual representation of the processes required to bring a product to market
- Creates a common understanding of the sector structure and how it operates
- Identifies the various stakeholders participating in sector production and their performance
- Provides a tool to analyse where performance gaps occur and where improvements to the sector could be made.

The value chain for the dairy sector in Sindh is presented in Figure 10.

Figure 10: The value chain



Source: ITC.

Institutional and policy support ecosystem

The success of the dairy sector in Sindh will depend not only on the internal capacities of the companies operating in the industry but also on the role of various ministries and public institutions, as well as other technical agencies. For the sector to achieve long-term sustainable growth, participating enterprises must rely on a capable network of government and private sector support institutions. The overall trade and investment support network of the dairy industry in Sindh is considered for this sector Strategy as the aggregate institutional framework in the country, bringing together institutions with a particular interest in, or bearing on, the sector's export development and competitiveness.

These institutions or agencies support and promote the sector through the provision of a wide range of trade-related services to government and enterprises comprising the following areas:

- Policy support (ministries, government agencies, etc.)
- Trade services (quality management bodies, Chambers of Commerce and Industry (CCIs), etc.)
- Business services (professional associations, groups, etc.)
- Educational services and civil society network (universities, research institutes, laboratories, NGOs, etc.)

Key support institutions are presented in relation to their level of importance for the sector and capacity to fulfil mandates related to the dairy sector (see **Error! Reference source not found.**). The categorization is based on observations of ITC analysts and the sector core team. A more extensive list of trade and investment support institutions involved in the development of the sector and their functions along the value chain is presented in Annex 3: Trade and investment support institutions involved in the development of the dairy sector in SindhAnnex 3: Trade and investment support institutions involved in the development of the dairy sector in Sindh. Specific capacity and resource issues must be addressed if these institutions are to support the industry effectively. Several interventions aiming at strengthening the sector's institutional capacity are addressed in the Strategy's PoA, including the following:

- Establish the Sindh LDC, comprising three subcommittees (dairy, meat and leather) to guide sector development (**PoA activity 1.1.1.**)
- Establish an autonomous epidemiology and infectious disease control authority to monitor surveillance of outbreaks of infectious diseases (**PoA activity 1.2.3.**)
- Create and deploy a mobile / outreach vaccination and animal health services team to deliver vaccine and veterinary services to remote rural communities (**PoA activity 1.2.6.**)
- Undertake continuous skill and competency development on breeding practices and technologies, including AI technology and embryo transfer technology (**PoA activity 2.1.5.**)
- Carry out continuous capacity-building and enhancement of the food inspection services and appoint / recruit veterinarians and meat / dairy technologists (**PoA activity 3.1.6.**)

Table 5: Perception of influence versus capacities of trade and investment support institutions

		Capacity of the institution to respond to the needs of the dairy sector	
		High	**Low**
Capacity to influence the dairy sector	**High**	• State Bank of Pakistan • Ministry of Commerce • Planning and Development Department • Pakistan Dairy Association (PDA) • Dairy and Cattle Farmers Association (DCFA) • Sindh Agriculture University (SAU) • Shaheed Benazir Bhutto University of Veterinary and Animal Sciences (SBBUVAS) • Sindh Enterprise Development Fund (SEDF) • Pakistan Standards and Quality Control Authority (PSQCA)	• DoLF • Local government bodies • Sindh Food Authority (SFA) • Sindh Institute of Animal Health (SIAH) • Sindh Environmental Protection Agency (SEPA)
	Low	• Small and Medium Enterprises Development Authority • Trade Development Authority of Pakistan • Department of Industries and Commerce (DoIC) • Department of Agriculture, Supply and Prices (DoASP) • Karachi CCI, Hyderabad CCI, Federation of Pakistan CCI	• Pakistan Council of Scientific and Industrial Research (PCSIR) • National Veterinary Laboratory • Pakistan Agricultural Research Council
Federal agency, Provincial agency, Private sector agency			

Source: ITC analysts and the sector core team.

Box 2: Implications of the influence versus capacities of the main trade and investment support institutions

The implications of high or low capacity and influence among the institutions in the dairy sector can impact implementation of the Strategy and constrain policy-making and, consequently, sectoral development. Institutions with higher capacity and influence generally have a greater potential to drive positive change and address sector-specific challenges effectively.

High capacity and high influence: Institutions that have the resources, expertise and authority to respond effectively to the needs of the sector. As a result, these institutions can:

- Efficiently formulate and implement policies and reforms
- Address regulatory challenges, facilitate trade and provide financial support to the industry
- Adhere to regulations for environmental sustainability, minimizing negative impacts
- Coordinate and support implementation with various stakeholders.

Low capacity and high influence: Institutions that may face a significant disconnect between the potential for influence and the ability to address the sector's needs effectively. Although these institutions have high influence over the sector's development, their limited capacity in regard to resources hinders their ability to respond to the sector's specific requirements and challenges effectively. This disconnect could result in missed opportunities to meet the sector's requirements, implement necessary reforms and provide adequate support for its growth and development. This highlights the need to strengthen institutional capacity to better respond to the needs of the dairy sector and bridge the gap between influence and effective action.

High capacity and low influence: Institutions with high capacity but low influence may face limitations in their ability to shape the overall development and direction of the dairy sector directly. While they can provide support and assistance to address immediate needs, their ability to enact broader changes or policies that can drive the sector's growth and competitiveness may be constrained.

The regulatory framework

The dairy industry in Sindh is regulated by many laws and regulations, including amendments controlling animal safety, feed, breeding, health and human food safety.

As emphasized in the Sindh Livestock Sector Policy, comprehensive policy interventions should be pursued, involving all stakeholders, including public–private partnerships and value chain actors. Efforts are needed to create a pragmatic policy regime and enable regulatory and policy frameworks that are investment-friendly and supportive of entrepreneurship. Several institutional adjustments are presented in the 'way forward' section of this Strategy. Table 6 presents the laws and regulations applicable to and having the greatest impact on the dairy sector in Sindh.

Table 6: Government policy interventions in the sector

Name of law / regulation	Objective / aims	Impact on the sector
The Sindh Livestock Breeding Act, 2016	Provides for the establishment of livestock breeding and genetic improvement centres and for the improvement of animal breeds to promote livestock production in the province. The Act notably provides for the establishment of the Livestock Breeding Services Authority and for the creation of the Livestock Breeding Services Authority Fund. It also provides for the recording of pedigrees and performance, including the approval and regulation of breeders' associations and breeding services.	The law provides for the development of infrastructure for livestock breeding, including breeding farms, veterinary research centres and training institutions.
The Sindh Livestock Breeding and Development Act, 2009	Provides for the improvement and development of livestock in the province. The law has provisions for the conservation, breeding and development of livestock in Sindh and provides for the establishment of livestock farms, research centres and training institutions to promote livestock production in the province.	Promotes the breeding, rearing and development of livestock in Sindh by establishing a regulatory framework to ensure the quality and productivity of the livestock sector.

Pakistan Dairy (Amendment) Ordinance 2006	This ordinance sets the standards and specifications for dairy products in Pakistan, including milk, yoghurt, butter and cheese. It defines the roles and responsibilities of different stakeholders in the dairy industry (such as dairy farmers, processors and traders) and sets requirements for the labelling, packaging and advertising of dairy products.	The ordinance aims to ensure the safety and quality of dairy products for consumers and promote the development of the dairy industry in Pakistan.
The Sindh Livestock Registration and Trade Authority Act, 2017	Provides for the establishment of the Sindh Livestock Registration and Trade Authority for livestock registration, tagging and identification, and the development of activities related to livestock products, trade and export thereof in the province of Sindh. Establishes a system of animal registration and identification with a traceability framework based on international standards. The act is yet to be implemented.	Ensures the quality of animals and animal products to enhance the trade, marketability and market value of animals and animal products.
The Sindh Animal Disease Control Act, 2022	New legislation passed to control and prevent the spread of contagious animal diseases. The Act provides for the establishment of a Sindh animal disease control authority, which is responsible for implementing and enforcing the provisions of the Act.	Provides for the control, prevention and eradication of animal diseases in the province.
The West Pakistan Pure Food Ordinance 1960 and its amendments	The ordinance regulates the quality and safety of food products, including dairy products, and prohibits the manufacture, sale or storage of adulterated or misbranded food products in Sindh. It also sets standards for the labelling, packaging and advertising of food products, including dairy products.	The ordinance aims to protect the health and safety of consumers and promote the development of the food industry in Sindh.
The Sindh Food Authority Act, 2016	The Act establishes SFA as a regulatory body responsible for ensuring the safety and quality of food products in the province.	The Act empowers the SFA to regulate and monitor the production, processing, packaging, labelling, import, export, storage and distribution of food products.
Sindh Environmental Protection Act, 2014	Establishes SEPA and provides for the conservation, protection, rehabilitation and improvement of the environment in the province of Sindh, Pakistan.	Dairy farms and dairy product processors would need to comply with the regulations and standards set out in the act.

Source: ITC.

A number of initiatives supporting the development of the dairy sector in Sindh have also been undertaken. A list of the most relevant support programmes and plans is presented in Annex 4: Initiatives supporting the development of the dairy sector in Sindh.Annex 4: Initiatives supporting the development of the dairy sector in Sindh

Key issues affecting the competitiveness of the dairy sector in Sindh

The value chain diagnostic above outlines the operations of the dairy industry in Sindh and provides an overview of the constraints faced by stakeholders at each stage in the chain. To remain realistic and resource-efficient, this Strategy will not be able to focus on all the issues affecting the value chain. An informed selection of the most critical issues was made. To assess relative importance, the criteria used are the level of disturbance, as perceived by stakeholders, and the ease of resolution in terms of cost and time involved.

The following section describes the key performance issues identified as challenges to the performance of the Sindh dairy sector. Listed below each major constraint are the root causes that impede sector performance.

Supply-side constraints

Main challenges	Root causes	PoA references
Poor genetic resources and the prevalence of low-yield milk breeds	Limited research and development (R&D) to optimize livestock potential and further improve the genetics of native breeds	2.1.1., 2.1.6.
	Outdated and inefficient reproduction centres and semen production units (SPUs)	2.1.3., 2.1.4.
	Improper and shortage of breeding services	2.1.2., 2.1.5.

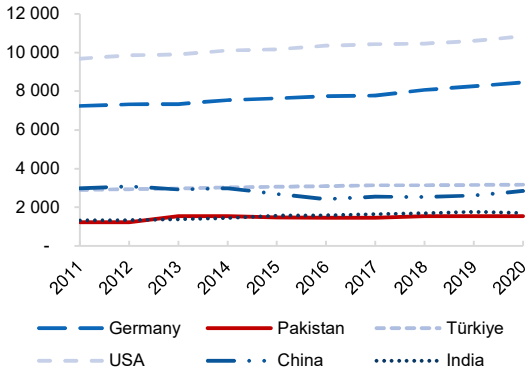
Poor animal nutrition resources and supply systems prevent small farmers from keeping high-producing animals	Shortage of fodder production with important seasonal shortages limits livestock production	2.2.1., 2.1.2.
	Unavailability of grass and fodder with high protein content, with limited R&D in the field	2.2.5.
	Poor and low-yield animal feed, with an underdeveloped animal feed industry	2.2.3., 2.2.4.
	Limited knowledge and skills in the selection of fodder type, seed selection and appropriate cultivation and preservation practices	2.2.3., 2.2.8.
Limited adoption of good husbandry practices	Limited adoption of good husbandry practices for animal production and farm management	2.3.1., 2.2.7.
	Limited access to modern dairy farming technologies	2.3.3.
	Limited access to finance for smallholder livestock farmers to modernize their facilities	2.3.4.

The productivity of dairy animals in Pakistan is significantly lower than in other major milk producing countries

The average milk yield per animal in Pakistan is significantly lower than in other major milk-producing countries. In 2020 the reported average lactation yield for cattle in Pakistan was 1,537 kg per animal, or about seven times lower than that of the best-performing country, the United States, and half that of Türkiye (see Figure 11: Comparison of yield of fresh whole cow milk in various countries, 2011–2020 (kg/animal)). This signifies that these countries can produce a greater quantity of milk by managing the same number of dairy animals, which brings down the cost of milk production (Pakistan Business Council, 2022). As mentioned earlier, the yield of buffalo milk in the country is significantly higher, at about 2,419 kg per animal. The fact that very few countries produce large volumes of buffalo milk makes the international comparison for this category of products difficult. Data is unconfirmed and based on outdated surveys.

The low productivity per animal is attributed to low genetic potential, lack of proper management practices, inadequate health coverage and poor nutrition of milch animals, particularly in the rural subsistence production system.

Figure 11: Comparison of yield of fresh whole cow milk in various countries, 2011–2020 (kg/animal)



Source: ITC calculations based on FAOSTAT data (www.fao.org/faostat/en/).

1. Poor genetic resources and the prevalence of low-yield milk breeds

It is currently impossible to achieve significant improvement in milk yields in the province given the lack of advanced technology transfers and overall R&D to optimize the potential of cattle and buffalo stock, and further improve native breeds' genetics. Sindh is yet to develop good-quality, disease-resistant local breeds that perform well in local conditions, including with shorter calving intervals and longer lactation periods. Inadequate AI infrastructure is also a significant impediment to improving breeding services, including semen handling. Additionally, there is a general lack of technical skill and awareness regarding the breeding process and its benefits. Selective breeding should therefore be supported, as well as the adoption of modern breeding technologies to increase the potential of local breeds.

2. Poor animal nutrition resources and supply systems prevent small farmers from keeping high-producing animals

Inadequate fodder production with low protein content and severe seasonal shortages results in suboptimal animal nutrition and relatively low productivity of animals and milk production. Limited knowledge and skills in the selection of fodder type, seed selection and appropriate cultivation and preservation practices further exacerbates the issue. The poor quality of uncertified seed that gives poor forage yield is another issue, with farmers generally not producing these seeds. Furthermore, the fodder area is decreasing and progressively being replaced by cash crops that have more economic potential.

Prohibitive costs do not allow most smallholders to access high-quality, balanced and nutritious diets for their animals, such as silage or concentrates. There has been a sharp increase in feed prices, and access was difficult after the 2022 floods, as an estimated 60% of roughages were washed away. A large amount of stored wheat straw, on which dairy formulation is heavily reliant, was washed away. Floods also affected the wheat-sowing areas in Sindh, making sowing highly uncertain. In addition, quality feed is relatively expensive in Sindh and only affordable for large farms. This is due to the underdeveloped local formulated feed industry (for example, pelletized feed products) with limited outreach in rural areas, coupled with expensive imports of animal feed and high-nutritive ingredients due to high import duties. As a result, for most of the year, the amount fed is insufficient to support maintenance requirements that would allow a milch cow or buffalo to attain its genetic potential for milk production (de Jong, 2013, p. 15).

3. Limited adoption of good husbandry practices

Due to the lack of education on good farming practices and the limited uptake of modern dairy techniques, traditional rural subsistence production systems often neglect crucial practices such as animal nutrition and health, leading to low dairy yields, high production costs, inconsistent production and high calf mortality. The lack of access to and high costs of farming machinery and technologies further affect the productivity and profitability of small dairy farms.

Most of the milk that reaches the domestic market is adulterated and unhygienic, making it unsafe for human consumption. The perishable nature of milk, the long distance between production and consumption sites, the inefficient marketing structure, and the number of intermediaries in hauling milk through the marketing chain are factors that lead to adulteration and contamination of milk (de Jong, 2013, p. 21). Apart from contamination associated with poor and unhygienic on-farm practices, malpractices involving the use of adulterants by intermediaries (including *dhodhis* and retail shops) to increase volume and prevent spoilage is common. The lack of cold chains and cooling tanks (chillers) in the informal system notably pushes producers and traders to mix chemicals into milk for preservation, particularly when transported over long distances.

Currently, the lack of a food safety system to prevent adulteration in the informal market, and the absence of quality checks at the source and across the supply chain, do not allow curbing of these practices. This phenomenon is more important given that only a very small proportion of the milk produced reaches processing units to produce pasteurized and UHT packaged milk. Most products enter the market through informal channels in the form of raw milk that has not been pasteurized.

The local dairy industry faces a lack of appropriate technologies and skills at the small and medium-sized enterprise (SME) level for value addition. The limited access to and high costs of farming machinery and technologies result in limited production of value-added dairy products such as yoghurt, cheese and other dairy by-products. There are also no mechanisms for transferring production technologies at the grassroots level from the extension system, further exacerbating the issue. Another challenge is the lack of technical know-how from small dairy farmers to process value-added products, including yoghurt, ice cream, candy, milkshakes, cheese, butter, dry-evaporated condensed milk (*khoya*) and butter oil (ghee). Entrepreneurship knowledge, including knowledge of by-product selling, should also be strengthened. Rural communities should also be supported to identify markets and sell points for these products and be encouraged to open shops / start-ups for nearby farmers in villages.

Business environment constraints

Main challenges	Root causes	PoA references
The regulatory landscape is not conducive to private sector development	Lack of clarity of the regulatory framework, with a multitude of laws currently applicable to the sector	1.1.2., 3.1.3.
	Insufficient public–private dialogue for sound policy development	1.1.1.

	'Fresh milk', 'powdered milk', and 'milk for infants' are subject to the fixation of prices, which is holding the dairy sector back in terms of private investment	1.1.3.
Lack of reliable livestock data for informed decision-making	The veracity of the available data on livestock population and milk production is unconfirmed and contested	1.3.1., 1.3.2.
The traditional subsistence production system is mostly informal and poorly organized	The lack of cooperative structures or producers' groups does not allow for economies of scale, limits the bargaining power of individual farmers and does not favour strong market links	3.2.1.
	Limited awareness among rural communities about the benefits of cooperation and associations	3.2.2.
Lack of monitoring and control of animal diseases by public institutions	Unavailability of data and monitoring regarding outbreaks of infectious diseases	1.2.3.
	Insufficient supply of quality vaccines for TADs	1.2.2.
	The lack of traceability of livestock makes it difficult to control the spread of diseases	1.2.7.

The regulatory landscape is not conducive to private sector development. The devolution of powers and responsibilities that resulted from the Eighteenth Amendment to the Constitution of Pakistan (passed in 2010) has resulted in a fragmented and complex regulatory framework for the livestock sector, with uncertainty and confusion regarding the laws that apply to it in the province. Multiple authorities are responsible for the sector (including provincial and district governments as well as various regulatory bodies), adding to the complexity of the institutional landscape, which lacks coordination and cohesion in its management, notably regarding food safety and quality management. This lack of clarity regarding the mandates and responsibilities of institutions has contributed to the weak enforcement of the legislative and regulatory framework in the province.

Lack of reliable livestock data for informed decision-making. Effective policymaking, market analysis, and monitoring and evaluation in the livestock sector is extremely difficult given the lack of reliable livestock data. The veracity of the available data on livestock population and milk production in Sindh is unconfirmed and contested because figures are based on a static growth rate applied to the numbers reported in the 2006 Livestock Census and calculated using the inter-census growth rate between the 1996 and 2006 Livestock Censuses.

Data is currently scattered across different departments, resulting in a lack of segregated data available for several key indicators including milk production at the district level, average milk yield per cow / buffalo, data on value-added products, number of dairy farms, number of productive and non-productive animals, number of farmer and milk trader associations, income generation, availability of feed and fodder, etc.

Access to up-to-date and reliable data is essential for effective planning, policymaking and resource allocation within the sector, as it helps policymakers design and implement evidence-based policies and programmes that address the specific needs of different subsectors and regions, and track progress against targets and indicators. Reliable empirical data is also critical for market analysis because it helps producers, traders and policymakers understand market dynamics, demand patterns and consumer preferences, which can inform pricing strategies.

The traditional subsistence production system is mostly informal and poorly organized. The fact that farming communities and small dairy farmers mainly operate individually does not allow for significant economies of scale and limits their bargaining power. Dairy farmers' access to quality inputs such as feed and modern machinery is limited by this lack of collective action through structures such as cooperative societies or milk producers' groups. Encouraging the development of such organizations is instrumental to improving the outreach of small dairy farmers, particularly for the provision of extension and breeding services and training on animal management practices. Cooperatives also allow for improved market links for small dairy farmers, who can also benefit from economies of scale to access inputs such as feed, vaccines, machinery, etc. The promotion of cooperatives is widely viewed as the most important institutional arrangement for spurring dairy development in Sindh. Efforts should be made to accelerate the systematic promotion of dairy cooperatives through financial and policy support.

There is lack of monitoring and control of animal diseases by public institutions. The presence of TADs, specifically foot and mouth disease (FMD) and lumpy skin disease, hugely impacts market supply and results in significant financial loss. There is no comprehensive control and eradication programme for TADs in Sindh,

nor have any disease-free zones or compartments been established. Furthermore, the province has limited diagnostic facilities for diseases, especially in rural areas, due to a lack of well-equipped and adequately staffed diagnostic laboratories. Additionally, there is a lack of proper monitoring and surveillance mechanisms, which contributes to the unavailability of data regarding outbreaks of infectious diseases.

Against this backdrop, the insufficient supply of quality vaccines for TADs and veterinary medicines significantly hinders the growth of Sindh's livestock sector. Small-scale rural dairy farmers have limited access to vaccines and veterinary extension services to combat livestock diseases that adversely affect milk yield and body condition, in particular FMD and haemorrhagic septicaemia. Due to the lack of mass vaccination programmes and the ineffectiveness and limited availability of locally produced vaccines, farmers in the region have no alternative but to rely on expensive imported vaccines that are often suboptimal and unaffordable for most farmers. To date, it is estimated that the total vaccine production from the Veterinary Research Institute only covers 15% of the province's livestock population. The lack of awareness of the merits of vaccine use in the traditional subsistence system also contributes to this low coverage.

Market entry constraints

Main challenges	Root causes	PoA references
Lack of animal traceability mechanisms in the province	Absence of a clear and comprehensive TAD control and eradication strategy, and of disease-free compartments and zones	1.2.1.
	Unavailability of data and monitoring regarding outbreaks of infectious diseases	1.2.3.
	Insufficient supply of quality vaccines for TADs	1.2.2.
	The lack of traceability of livestock makes it difficult to control the spread of TADs and restricts the penetration of high-income countries' markets	1.2.7.
The fixed prices regime erodes dairy farmers' margins and renders the market unattractive	The costs incurred by dairy farmers to produce milk do not allow for profitable business and create a favourable environment for product adulteration	2.2.3.
	The price control regime in place to set prices for milk sold in the domestic market discourages investment	1.1.3.
The industry faces significant challenges related to quality control throughout the supply chain	Milk adulteration is common practice, presenting a risk to public health	1.1.2., 3.1.7.
	Inefficient food safety control and inspection services along the supply chain	3.1.5., 3.1.6., 3.1.7.

The lack of animal traceability mechanisms in the province is a challenge for producing and marketing livestock, controlling and preventing disease, ensuring food safety and meeting export markets' requirements. Currently, the dairy supply chain is mainly informal and undocumented, and does not allow for systematic animal traceability and registration (no animal sales records and no history of animals, including birth, movement, vaccination and genetics), making it difficult to trace, control and prevent the spread of diseases. Similarly, in the event of food contamination, traceability enables the authorities and private businesses to trace the contamination to its source and recall the product from the market. Finally, a basic tagging system and animal registration systems are essential tools for verifying compliance with regulatory and quality standards, and for meeting the increasingly strict requirements of export markets.

The fixed prices regime erodes dairy farmers' margins and renders the market unattractive. The price capping on fresh milk by the local governments in Karachi and Hyderabad does not allow dairy farmers to raise the price of milk to offset rising production costs. With the increase of input prices such as electricity, medicine, fodder, fuel and transportation costs, fixed retail prices of fresh milk have led to imbalanced pricing and contributed to eroding dairy farms' profits. The lower margins for farmers discourage new investment for modernizing urban dairying and contribute to keeping average yields low, as the cost involved in the adoption of good farming practices and use of high-quality inputs becomes unaffordable for most farmers. This also hinders the growth of the formal milk retail trade. The price capping has also caused an increase in milk adulteration and an unhealthy supply system because milk traders and retailers are tempted to use adulterants to increase volume and prevent spoilage to maximize their profits.

The dairy industry in Sindh faces significant challenges related to quality control throughout the supply chain. A lack of proper quality control and safety standards limits the export potential of dairy products from Sindh. International buyers require high-quality products that meet certain standards and certifications,

which can be difficult to achieve without proper quality control measures in place. To address these challenges, there is a need for a comprehensive approach to improving quality control throughout the dairy supply chain in Sindh.

High losses of milk through transportation from farms to processing units also affect the productivity and profitability of the sector. The weak networking of commercial milk collection companies covering all production areas in Sindh and the prevalent use of conventional milk collection equipment and transport methods by middlemen contribute to these losses. The lack of a cold chain – including specialized vehicles and cooling tanks (chillers) – in the informal system also results in the unhygienic mixing of chemicals for milk preservation. The authorities should work jointly with large dairy processors to meet cold chain requirements and ensure sufficient cold storage facilities for both milk storage and further chain transportation facilities to chill milk and maintain its shelf life. Addressing these challenges will be critical to improving the dairy industry in Sindh and ensuring a stable supply of high-quality milk to consumers.

Development goals

Main challenges	Root causes	PoA references
Limited adherence to environmental standards and poor waste management	Laws and regulations exist to promote cleaner production but are neither comprehensive nor effectively enforced	1.1.2.
Livestock production has significant environmental impacts	Lack of R&D to promote climate-smart feeding regimes generating fewer emissions	2.2.5.
	Lack of 'green' initiates in the livestock sector for the conversion of manure (biomass) to biogas or the use of renewable energy sources	2.3.6., 2.3.7.
	Vulnerability of small farmers to natural disasters	2.3.5.
	Lack of R&D to develop resistant, high-yielding breed variants adapted to the harsh local climatic conditions	2.1.1.
Gender inequality remains a significant issue in the livestock sector	Limited opportunities for women to participate in training on livestock management and entrepreneurship	2.3.1., 3.3.4.
	Limited female representation among veterinary practitioners	2.3.2.

Limited adherence to environmental standards and poor waste management. Dairy farms are notorious for their carbon footprint with high greenhouse gas emissions, and they generate significant, often poorly managed, solid waste. Most dairy farms have not adopted proper wastewater and solid waste management systems, and effluent treatment is weakly regulated, regardless of existing environmental standards. The result is harmful discharges released into the surrounding environment, particularly from the peri-urban farms around Karachi. For this reason, SEPA recommended shutting down 100 dairy farms.

Although several laws and regulations can help promote cleaner production in the sector, they are not as effective or comprehensive as they could be and facilities are not adequately controlled or monitored. Insufficient coordination between responsible institutions and inefficient provincial implementation are both factors. At the provincial level, there is limited capacity for supervisory bodies such as SEPA to monitor compliance with environment protection laws and standards, mostly due to limited human resource capacity and skills. Owing to this lack of capacity of supervisory bodies, most of the industry operates with limited adherence to the standards set under the *Sindh Environmental Protection Act, 2014*.

Livestock production has significant environmental impacts. Some of the key environmental concerns associated with rearing livestock include:

- **Greenhouse gas emissions:** Livestock production is a major contributor to greenhouse gas emissions, particularly methane and nitrous oxide. These gases have a higher global warming potential than carbon dioxide, contributing to climate change.
- **Land use:** Livestock farming requires vast amounts of land for grazing and growing animal feed. This leads to deforestation, as forests are cleared to create more pastureland or to cultivate crops for animal feed.
- **Water use and pollution:** Livestock farming requires substantial amounts of water for animal drinking, cleaning and crop irrigation. The intensive use of water resources can strain local water supplies. Moreover, livestock waste and the runoff from animal farms can pollute nearby water bodies, leading to water contamination.

To mitigate some of these environmental concerns, the Strategy supports the implementation of sustainable and responsible practices such as reducing greenhouse gas emissions, for instance through the production of climate-smart animal feed and fodder and the development of breeds adapted to the local climate. Recommendations for improving animal welfare, enhancing wastewater management, promoting sustainable pasture and rangeland management practices, and developing green energy sources have also been formulated.

Gender inequality remains a significant issue in the livestock sector in Sindh. Women in rural areas are often responsible for the day-to-day management of livestock, including cattle, buffalo, goats and sheep. Women's involvement in livestock management is typically not recognized or valued and they often lack access to resources such as veterinary services, training and credit. In Sindh, women's participation in the livestock sector is further limited by cultural and social norms, limiting their opportunities to participate in livestock markets and access information and training on livestock management. To address these issues, efforts should be mobilized to promote gender equality in the livestock sector in Sindh, such as by providing training and support services specifically for women.

The way forward: Strategic orientations and market opportunities

The preceding section of the Strategy document delineates the sector's value chain and reviews its overall positioning within the national and global industry context to confirm its current performance. This section discusses the strategic development and positioning of the sector to increase its future performance. It addresses two pertinent questions: 'Where do we want to go?' and 'How do we get there?'.

Answering these questions will guide Strategy implementation over the next five years. Given the ample supply of livestock, coupled with the projected growth in demand for dairy products, the Sindh dairy industry is eminently equipped to realize the vision formulated and agreed upon by stakeholders who participated in the consultations for the design of the Dairy Sector Development Strategy for Sindh. It signifies the consensus among the province's stakeholders. The sector's vision is:

'To build a sustainable, quality-driven and profitable dairy sector in Sindh, leveraging modern farming practices and the genetic improvement of dairy animals.'

The following strategic and operational objectives have been defined to achieve this vision and pursue the key value chain transformations required to unlock the industry's potential.

Strategic and operational objectives

Strategic objective 1 **Foster animal disease prevention and private sector development, supported by informed regulatory decision-making**	• 1.1. Harmonize and strengthen the legal and regulatory framework, making it conducive for private sector development • 1.2. Foster efficient management and control of TADs and improve livestock traceability • 1.3. Ensure the availability of reliable livestock data across the value chain
Strategic objective 2 **Enhance milk production through increased productivity**	• 2.1. Optimize the genetic potential of dairy animals • 2.2. Promote better nutrition for dairy animals • 2.3. Improve dairy farm management and promote sustainable practices
Strategic objective 3 **Ensure the production of safe, high-quality milk and promote value addition**	• 3.1. Improve food safety and quality management along the supply chain • 3.2. Optimize the milk supply chain and enhance market links • 3.3. Support the production and marketing of value-added dairy products

Structural adjustments to the industry

Institutional, legal and regulatory amendments

The objectives pursued by the amendments proposed in this section are twofold.

1. **Streamline and ease the institutional, legal and regulatory framework**

As per the Eighteenth Amendment to the Constitution of Pakistan passed in 2010, policy, planning, development and governance of the agriculture sector fall within the ambit of the provincial government. As discussed in the section describing the key issues affecting the competitiveness of the sector, this devolution of powers and responsibilities has resulted in a fragmented and complex regulatory framework for the livestock sector, with uncertainty and confusion regarding the laws that apply to it in the province and a lack of clarity regarding the mandates of the multiple authorities involved in the development of the sector.

In this context, efforts are now required to review, streamline and harmonize all legislation that applies to the livestock sector in Sindh, and strengthen institutional coordination and implementation mechanisms.

2. Create an enabling environment for businesses that supports competitive production and export of livestock products

Consistent with the Sindh Livestock Policy, the Dairy Sector Development Strategy emphasizes the role of GoS as a regulator, focusing on developing a regulatory framework that is conducive to private sector development and supporting domestic and foreign investment. It is further recommended that the government lets the private sector take the lead on the production side, with progressive disinvestment of public-sector-owned production facilities. Therefore, the Strategy calls for actions to create a coherent, efficient and enabling policy and regulatory regime.

In particular, GoS shall take the following policy interventions:

- Support the gradual liberalization of the existing price capping regime in the dairy sector in favour of market-driven instruments which simultaneously ensure quality for users and profitability for producers. An open market where farmers can set their own prices would spur competition and investment, in turn helping formalize the sector. An alternate mechanism may also be evolved to facilitate the marketing of milk. **PoA activities 1.1.3.a) and b)**
- Establish the LDC, comprising three subcommittees (dairy, meat and leather) in the form of public–private dialogue platforms to guide sector development. **PoA activity 1.1.1.**
- Establish an autonomous epidemiology and infectious disease control authority to monitor surveillance of infectious disease outbreaks and be responsible for animal-related vaccination and medicine supply to improve reaction time in case of outbreaks. **PoA activity 1.2.3.**
- Growing concerns relating to problems surrounding informal or 'loose' milk production led the public health authorities to discuss the possible introduction of a ban on fresh milk. This could be done through the enactment of a minimum pasteurization law – as developed in Punjab – to be implemented through a phased approach, whereby fresh milk would be progressively phased out from the market, starting with a pilot programme in urban areas. The production of UHT / pasteurized milk can also help overcome the demand-supply gap that the province is facing. However, the feasibility of such a measure still needs to be determined and, when implementing such measures, authorities must consider the lack of a cold chain, consumer preference for fresh milk, purchasing power and lack of quality control during milk collection. **PoA activity 3.2.3.**
- Introduce a Sindh Dairy Produce Act to make provisions for the regulation of the manufacturing, marketing and export of dairy products, including for the registration and control of premises engaged in manufacturing such products in Sindh. The Act should include a provision regulating the sale of raw milk in a controlled environment at a temperature not exceeding 4°C. This provision should be introduced through a phased approach, starting with a pilot project at the district level, with the required cold chain system in place. **PoA activity 1.1.2.**
- Along the same lines, and in line with international standards, legal requirements for dairy product labelling and packaging should be introduced and enforced in the province to ensure safe packaging and enable consumers to get comprehensive and trustworthy information about the content and composition of the product. **PoA activity 3.1.3.**

Value chain options

Value chain transformation is a condition to unlocking the potential for dairy industry growth in Sindh. Proposed options will integrate good practices, improve connections with dairy processors, and increase sector organization and coordination. These adjustments will allow the sector to achieve sustainability, supply consistency, product quality and capacities to conform to export requirements.

Value retention: Retain greater value through reinforcement of local production of inputs		
Value option	**How to implement**	**PoA links**
Improve animal health and nutrition	• Support the production of climate-smart feed locally and strengthen research in animal nutrition • Encourage the adoption of good husbandry practices and modern dairy farming techniques	Activities under operational objective 2.2.

Optimize the genetic potential of dairy animals for increased milk yields	• Undertake continuous competency development on breeding practices and technologies, and support academic research in that field • Modernize livestock reproduction and breeding research centres as well as SPUs	Activities under operational objective 2.1.
Value retention: Secure milk production in sufficient quality and quantity for the processing industry		
Value option	**How to implement**	**PoA links**
Reduce milk losses	• Develop milk collection guidelines for collection points and centres • Attract investment in milk collection and chilling facilities	3.2.3. 3.2.4.; 3.2.5.
Ensure safe milk production	• Adopt quality control measures for marketed milk – raw and pasteurized – in the smallholder supply chain at the different critical control points along the milk collection chains	3.1.7.
Value acquisition: Acquire greater value by improving the efficiency of small and medium-sized dairy processors		
Value option	**How to implement**	**PoA links**
Upgrade processing equipment and technology	• Introduce a programme to support small and medium-sized dairy processors to upgrade their productive structures • Attract investment in milk collection, chilling facilities and processing	3.3.2. 3.2.5.
Develop minimally processed food activities	• Conduct a modular training programme for farmers' communities on dairy farm management and value addition in dairy products • Develop farm equipment rental services	2.3.1. 2.3.3.
Increase the availability of skilled workers	• Carry out continuous capacity building and enhancement of the food inspection services and appoint / recruit veterinarians and meat / dairy technologists	3.1.6.
Value addition: Improve product quality, capitalizing on buyers' requirements		
Value option	**How to implement**	**PoA links**
Facilitate processors' compliance with food safety and quality management systems	• Accompany dairy farms in obtaining food safety and quality management certifications, including Global Good Agricultural Practices, Hazard Analysis Critical Control Points, ISO Food Safety Management 22000, and Pakistan standards on dairy products	3.1.4.
Improve livestock traceability	• Introduce a basic tagging system for the identification and registration of animals through a compartmentalization approach	1.2.7.
Support the production of pasteurized milk	• Develop and implement a minimum pasteurization law to improve the quality of fresh milk and gradually phase out fresh milk from the market	3.1.1.
Value distribution: Maximize the economic and social development impact		
Value option	**How to implement**	**PoA links**
Provide quality dairy products to the most vulnerable	• Develop milk-feeding plans for malnourished segments of society, including school milk programmes, milk-feed programmes for women, the elderly, and marginalized agriculture and construction labourers	3.2.7.
Support the development of rural farmers' communities	• Support income generation activities for rural communities through the development of dairy processing operations	3.3.4.
Promote gender equality and the empowerment of women	• Support the participation of women in training on livestock management and entrepreneurship • Increase female representation in veterinary practices to allow rural women farmers to have local female technicians to consult	2.3.1., 3.3.4. 2.3.2.

Investment opportunities

The development of better production capacity will require investment in key strategic areas of the dairy value chain in Sindh.

Consistent with the Sindh Livestock Policy, the Dairy Sector Development Strategy promotes the gradual disinvestment of public-sector-owned production facilities, including vaccine production plants and SPUs, by outsourcing to the private sector. There is great potential for corporate investment provided that GoS disinvests and provides an enabling environment to the private sector by formulating an investment-friendly and entrepreneurship-supportive policy environment. Liberalizing the sector by removing milk products from the list of essential commodities subject to the fixation of prices by local government would allow for greater mobilization of private investment in the sector, providing investors with higher profit expectations in a more competitive environment. As stipulated in the Sindh Livestock Policy, the mobilization of private investment

may be supported through land grant schemes, matching grants and tax relaxation regimes, among other means.

The following segments are critical for focused investment to upgrade the value chain.

Investment needs	Rationale
Attract investment in climate-smart feed production **PoA activities: 2.2.3., 2.2.4.**	**Why?** Significant investments are required to stimulate the local production of feed and fodder to ensure a year-round supply of high-quality nutritive feed and fodder and improve animal nutrition in the province. Importantly, this would significantly reduce livestock production costs and contribute to increasing yields. **How?** Mobilizing private sector investment through matching grants and technical assistance to private operators, with GoS playing an oversight and regulatory role. **Source of funding:** Private.
Create the conditions for private investment in SPUs and breeding services, including AI **PoA activities: 2.1.3. and 2.1.4.**	**Why?** Support the sustained supply of genetically improved calves for milk production through the development of high-yielding breed variants and advanced genetic improvement technologies, including embryo transfer technology and AI. For improved efficiency, innovation and increased resources, outsourcing SPUs and breeding services to the private sector should be supported, consistent with the provisions of the Sindh Livestock Policy for the public sector's gradual disinvestment. **How?** SPUs and breeding services could be operated through public–private partnerships (PPPs), with GoS playing an oversight and regulatory role. The functions and powers to manage, operate and maintain these services should be progressively transferred to private operators. Matching grants could also be provided to encourage private investment. **Source of funding:** Private.
Build partnerships with private operators to produce vaccine and medication production lines **PoA activity: 1.2.2**	**Why?** The large-scale production of vaccines and animal medication through the mobilization of private investment would improve the availability of vaccines and medicines adapted to local conditions at reduced costs. Outsourcing these production lines to the private sector is also consistent with the provisions of the Sindh Livestock Policy for the public sector's gradual disinvestment. **How?** Production lines are to be established through a PPP joint venture model, with a licence to special purpose vehicle companies under section 42 of the *Companies Act, 2017* ('Licensing of associations with charitable and not for profit objects'), with long-term management control from the private sector.[5] GoS would provide basic infrastructure, protocols and oversight. **Source of funding:** Private.
Hire private companies to develop and deploy livestock tagging systems, including software solutions for animal registration and identification **PoA activities: 1.2.7.**	**Why?** Animal traceability is essential to trace, control and prevent the spread of diseases. In case of food contamination, it enables the authorities and private businesses to trace it to its source. **How?** Introduce a basic tagging system for the identification and registration of animals through a compartmentalization approach and develop uniform animal registration and identification software solutions. **Source of funding:** Private and public for initial investment.
Work with international manufacturers of milk processing equipment to develop rental services **PoA activity: 2.3.3.**	**Why?** There is a dire need to modernize dairy farm equipment in the province. The introduction of more stringent regulations for the production, processing and packaging of milk will create investment opportunities for suppliers of milk equipment (including tractors, tanks, pasteurizers, separators, homogenizers, etc.). **How?** With the financial capacity of most dairy farmers being limited, a low-cost dairy farm equipment rental service could be developed to improve access to modern equipment and technologies, particularly for cooperative societies. Under the scheme, the government would procure and provide farming equipment to rural districts via custom hiring centres, also generating revenues. **Source of funding:** Public and private.

[5] The Securities and Exchange Commission of Pakistan is responsible for delivering licences to special purpose vehicle companies under section 42 of the Companies Act, 2017.

Incentivize investors to establish and expand dairy farms **PoA activity: 3.2.4.**	**Why?** Developing modern dairy farms would allow the production of better-quality, more hygienic milk. **How?** Investors can establish new dairy farms or expand existing ones by investing in land, infrastructure and high-quality dairy cattle. GoS could introduce a financing scheme offering long-term loans with zero interest rates for dairy cow breeders. **Source of funding:** Private.
Attract investment in green power generation systems, including biogas production units converting manure, and solar and wind energy systems **PoA activities: 2.3.6. and 2.3.7.**	**Why?** Support for the conversion of biomass into energy initiatives in the livestock sector will assist in generating large-scale economic benefits and environmental protection. **How?** A conducive policy and regulatory framework, together with an ambitious scheme for green investment, could be introduced to boost investments in developing the manure energy and recycling-based climate-smart organic fertilizers sector. PPP mechanisms could be introduced to boost renewable energy solutions in the livestock sector. **Source of funding:** Private, international donors.
Support private investment in milk collection and processing (packaged milk) **PoA activity: 3.2.5.**	**Why?** The packaged milk industry can benefit from the anticipated ban on sales of loose milk. With the growing concerns relating to problems surrounding informal or 'loose' milk production, Sindh is likely to see a progressive transition from unpackaged to packaged milk in the coming years. **How?** The government could offer incentives such as tax breaks, subsidies or low-interest loans to attract investors in the dairy sector. Active promotion from the government and the industry of the benefits of investment in milk collection and processing facilities, including improved supply chain efficiency and the potential for higher profitability, would also play a key role. **Source of funding:** Private.
Encourage SMEs to invest in value-added dairy products processing **PoA activity: 3.3.2.**	**Why?** Investment can also be made in the development of value-added dairy products such as yoghurt, cheese and butter, which can increase the profitability of the dairy sector and provide new market opportunities. **How?** Introduce an adding value grant for dairy products manufacturers / processors, particularly SMEs, to enable them to purchase equipment to process, diversify and add value to their products. This could include premises and equipment for preparing or processing dairy products. **Source of funding:** Public and private.

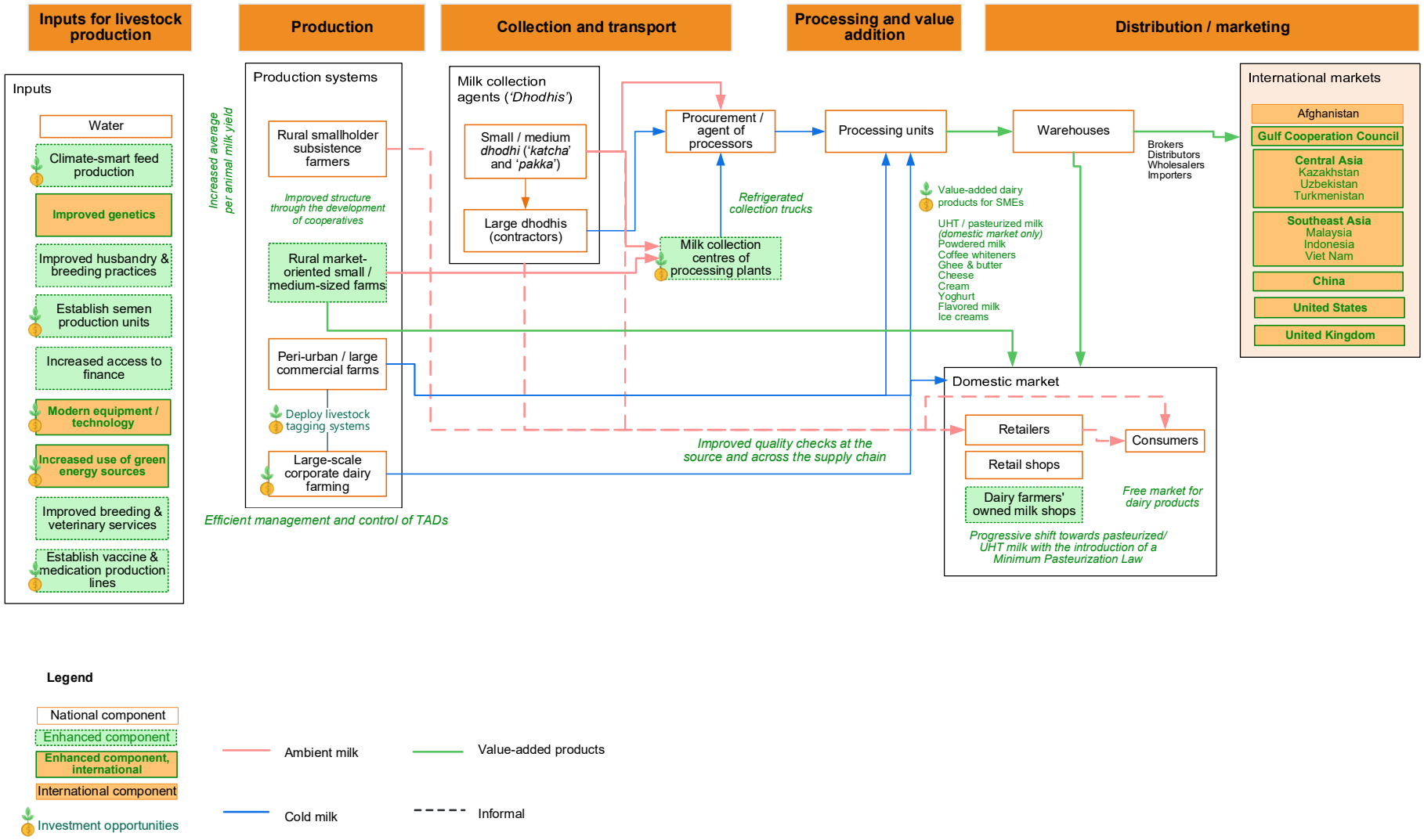
The future of the sector

Unlocking the dairy sector's potential in Sindh will require transformations throughout the value chain. These adjustments will result from the targeted efforts detailed in the Strategy's PoA that address the bottlenecks identified in the competitiveness constraints section above, also harnessing Sindh's dairy industry's desired future shifts and opportunities. Some compelling strategic future shifts along the value chain for Sindh's industry include:

- Enhancing per-unit animal productivity through improved animal nutrition, genetics and farming practices
- Strengthening quality control measures along the supply chain to ensure the production of safe, quality milk
- Creating an enabling environment supporting private initiatives and investment while ensuring food safety and quality
- Building market links with rural communities and spurring commercial farming, notably through structuring and strengthening rural supply chains
- Improving environmental management across the value chain and introducing climate-smart initiatives
- Fostering product diversification.

These adjustments are reflected in the future value chain schematic (see Figure 12).

Figure 12: The future value chain



Source: ITC.

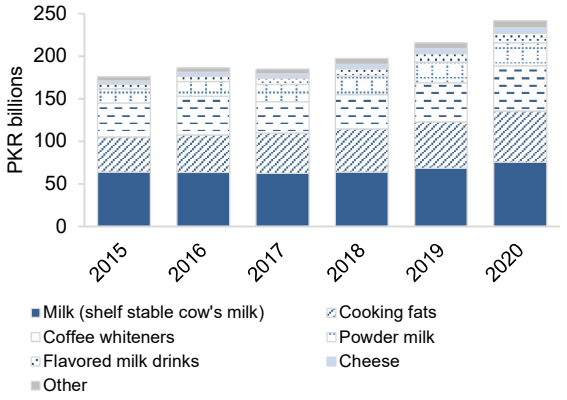
Product and market orientations

Dynamic growth in packaged dairy product sales in Pakistan

In the domestic market, sales of packaged products progressed at a dynamic annual growth rate of 6.5% over the period 2015 to 2020, on average, to reach PKR 241.8 billion in 2020 (Euromonitor International, 2021). Sales of dairy products are anticipated to grow at a robust compound annual growth rate of 2.9% over the period 2020 to 2025 (percentage constant value growth) to reach PKR 316.4 billion in 2025, supported by an expanding urban middle class with rising disposable incomes, pushing a number of households to buy a wider range of convenient products.

In 2020, packaged dairy products sales in Pakistan were dominated by shelf-stable cow's milk (31%), cooking fats (mostly ghee) (25%), coffee whiteners (used in tea) (22%) and powdered milk (11%) (see Figure 13). Other dairy products have also gained market shares in recent years, including flavoured milk drinks, cheese and yoghurt.

Figure 13: Sales of dairy products in Pakistan, 2015–2020 (PKR billions)



Source: ITC calculations based on Euromonitor International (2021).

Traditional grocery retailers remain the leading distribution channel for packaged dairy products, primarily due to the dominant position of independent small grocers, which are by far the most common grocery retailer outlets in the country. However, sales are shifting towards modern grocery retailers, with supermarkets gaining ground. The share of hypermarkets and supermarkets is expected to rise as a result of rapid urbanization. E-commerce is also gaining share, though from a very low base (Euromonitor International, 2021).

Retail sales of dairy products in Pakistan are largely dominated by Nestle Pakistan Ltd and Engro Foods (Pvt) Ltd. A number of domestic players are also present in the market, including:

- Millac Foods (Pvt) Ltd
- Pakola Products Ltd
- Dairyland (Pvt) Ltd
- Shakarganj Food Products Ltd
- Haleeb Foods Ltd
- Dalda Foods Ltd
- Fauji Foods Ltd

There is scope to develop dairy products in the domestic market

The rising domestic demand for dairy products should boost production and encourage more domestic and foreign players to enter the market. The expanding urban middle class, with rising disposable incomes and a growing young population, are expected to continue to alter consumer preferences in favour of a wider range of packaged dairy products, which are becoming more affordable and accessible. The experience gained on the domestic market should then allow Sindh-based dairy processors to venture into export activities.

There is scope for development and innovation in many value-added dairy products:

- **Packaged milk:** The shift towards packaged milk is gradually increasing in accordance with urbanization, retail development and rising incomes for some consumers. The packaged UHT category is popular in urban areas due to its convenience and longer shelf life and consists mostly of full-cream milk. The packaged milk industry can benefit from the anticipated ban on sales of loose milk and progressive transition from unpackaged to packaged milk in the coming years. There is also significant scope for development in the flavoured milk segment.
- **Coffee whiteners:** Due to low prices and strong promotion, the growing trend of using coffee whiteners in tea as opposed to full-fat milk is anticipated to support growth in this product area.
- **Cheese:** Cheese has become more popular as an ingredient in a variety of non-traditional recipes, particularly cheddar and mozzarella due to their versatility and use in fast food, notably the increasing popularity of pizza. These types of cheese are being rapidly adopted by upper-middle-class urban consumers and young consumers. Spreadable cheese is also increasingly gaining prominence and popularity in urban households.
- **Cooking fats (ghee):** Ghee – clarified butter made from the milk of a buffalo or cow – remains a key ingredient in Pakistani cuisine. Unpackaged sales are high but there is growing concern about the quality of unbranded alternatives.
- **Cream:** Rising awareness of continental cuisine is anticipated to propel the growth of packaged cream. The upward trend of consuming packaged cream in desserts, pasta and other dishes is likely to continue.
- **Yoghurt (plain and flavoured):** While packaged yoghurt still has a limited consumer base, there is growing interest in its convenience, hygiene and healthy image in urban areas. While the primary focus is expected to remain plain yoghurt, innovation in product variants promises growth in the flavoured yoghurt subsegment.
- **Powdered milk:** In addition to the nutritious characteristics of milk powder, demand for it has increased due to changing lifestyles and increased awareness.

There is scope for market and product development to strengthen the industry's export performance

The global dairy products market size was estimated at $481.7 billion in 2021 and is projected to reach $640.8 billion by 2030, poised to grow at a compound annual growth rate of 3.2% from 2022 to 2030 (Precedence Research, 2021)**.** Fuelled by increased consumption all over the globe, the milk segment leads the global dairy products market with a revenue share of 60.6%, valued at $291.7 billion in 2021. The supermarket / hypermarket distribution channel led the global dairy products market with a revenue share of 53.2% in 2021 and is anticipated to retain its dominance. The Asia-Pacific region dominated the global dairy products market in 2021 with a revenue share of 45.7%, and it is predicted that it will sustain its dominance during the forecast period. The region is expected to generate revenue of $297.5 billion by 2030 (Precedence Research, 2021).

Global demand for dairy products has been increasing and is driven by factors such as population growth, rising disposable incomes, urbanization and changing dietary preferences, particularly in emerging economies. Developing countries, such as China and India, have witnessed a significant increase in dairy consumption.

The rising demand for dairy products is driven by several factors, including:

- Growing population, with rapid urbanization in developing countries boosting the demand for convenient food, especially packaged milk and processed dairy products
- Rising personal disposable income of the consumer, particularly in developing Asian countries
- Rising awareness regarding the health benefits of dairy products, with consumers shifting preference from meat to dairy-based products for micronutrients and proteins
- Urbanization and convenience-driven lifestyles. Urban populations consume a larger proportion of processed dairy products, including packaged milk.
- Rising government schemes and initiatives regarding milk production and improving cattle productivity, including in the Asia-Pacific region.

Factors restraining the growth of the global dairy products market should also be considered:

- Growing demand for plant-based food alternatives, owing to growing awareness about animal welfare. Plant-based dairy product alternatives such as soy milk, almond milk and non-dairy ice creams are rapidly moving into the mainstream retail market.
- New product innovations such as non-dairy ice-creams, non-dairy cheese and whipped creams are expected to hamper growth of the global dairy products market.

- The increasing number of people who do not consume lactose, particularly due to the increasing incidence of lactose intolerance, resulting in consumers shifting towards vegan diets.

Dairy products exports are dominated by high-income countries

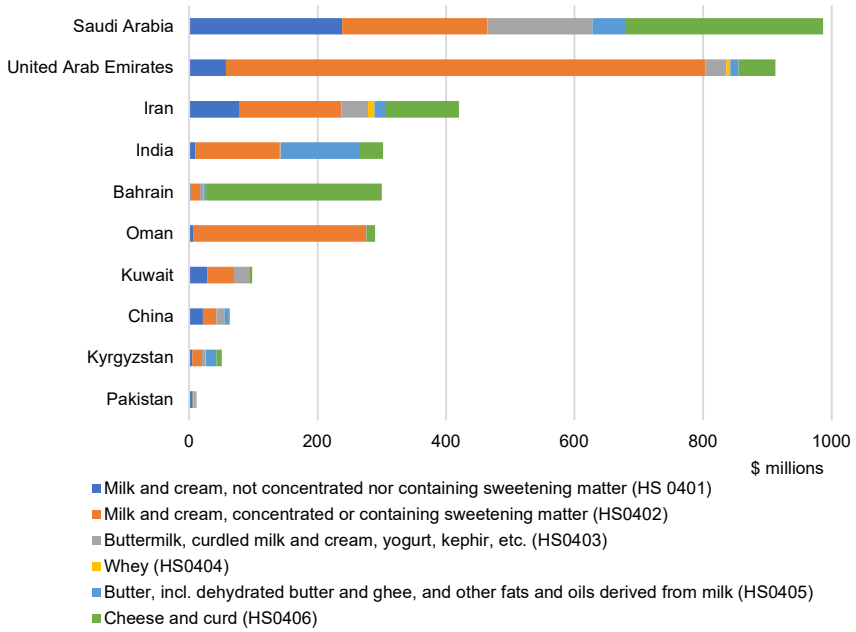
Dairy exports encompass a wide range of products. Some of the most commonly traded dairy commodities include cheese, butter, skimmed milk powder, whole milk powder, whey and condensed milk. Each product has its own demand and market dynamics. These products are exported to various regions and countries worldwide.

The European Union is one of the largest exporters of dairy products, with countries such as Germany, France, and the Netherlands being significant contributors. Other prominent dairy exporters include the United States, New Zealand and Australia.

In addition to other European Union countries that largely dominate global demand, traditional export destinations include Asia, particularly China and South-East Asian countries (particularly Indonesia, Philippines and Malaysia) and the Middle East. These regions have experienced growing demand for dairy products due to population growth, urbanization and changing dietary habits. Due to an inability to meet domestic demand, these countries have experienced a surge in dairy imports to bridge the gap between supply and demand. Other important markets include the United States, Russian Federation, Japan and Mexico.

The Gulf countries, a market of particular interest for Pakistan due to geographic proximity and existing trade relationships (including the United Arab Emirates, Saudi Arabia, Qatar and Kuwait), have witnessed a surge in dairy consumption driven by population growth, higher income levels and a diverse expatriate population. They import a wide range of dairy items, including milk, cheese, butter and yoghurt, notably from the European Union, New Zealand and the United States. To increase domestic production, reduce reliance on imports and ensure a stable supply of dairy products, some Gulf countries have launched initiatives to develop local dairy industries and have developed exports targeting other Gulf countries as well as countries in the Middle East.

Figure 14: Exports of dairy products in the subregion by value, 2021 ($ millions)



Source: ITC calculations based on United Nations Comtrade data (https://comtradeplus.un.org/).

Dairy exports are subject to stringent quality and safety standards imposed by importing countries. These standards aim to ensure that dairy products meet specific requirements regarding composition, labelling, packaging and sanitary conditions. Compliance with these standards is crucial to access international markets and maintain consumer confidence. In addition, dairy exports can face non-tariff barriers, such as licensing requirements, and sanitary and phytosanitary regulations. These measures are intended to protect domestic

markets, ensure food safety and prevent the spread of diseases. Compliance with these barriers may require exporters to meet specific certifications or undergo inspections.

Against this backdrop, based on global dynamics in the dairy sector, there are sustained market options for traditional dairy products and growth opportunities for emerging, non-traditional products, especially in regional markets. Embracing opportunities in the current context, it is suggested that the dairy industry in Sindh pursue the following market trajectories, with short-, medium- and long-term orientations.

A summary of the potential market and product development strategies is presented at the end of this section (see **Error! Reference source not found.**7).

Short term: Develop domestic sales and gain market shares in traditional regional markets

- **Increase sales of packaged milk and other value-added dairy products in the domestic market**

As detailed above, significant scope exists for local dairy processors to increase domestic sales of value-added packaged dairy products, boosted by rapid urbanization, rising disposable income levels, changing dietary habits and growing preference for convenience. In addition to traditional packaged milk, coffee whiteners, powder milk and ghee, promising opportunities exist for innovation in value-added products such as flavoured dairy beverages, flavoured yoghurt, cheese – including spreadable cheese and cheese slices – and creams.

In addition to the large dairy processors operating in the province, the development and marketing of value-added dairy products from SMEs should also be supported, particularly by fostering dairy value-addition technologies and skill development.

- **Increase market penetration in traditional regional markets, including Gulf countries, Central Asia and Afghanistan**

These markets have already shown demand for and acceptance of Pakistani dairy products. The industry can leverage these opportunities by enhancing product quality, increasing production capacity and improving distribution channels to meet the needs of these markets. Collaborations with local distributors and agents can also help the industry gain better market access and develop long-term relationships with buyers. Additionally, targeted marketing campaigns, promotions and participation in regional trade fairs can help raise awareness of Pakistani dairy products and strengthen the industry's brand image in these markets.

In the short term, the dairy industry may focus on traditional products such as powdered milk, butter, cheese and ghee in Gulf countries and Central Asia, and powdered milk and butter in Afghanistan.

Medium term: Product development in traditional markets and exploring new Asian markets

- **Expand the variety of dairy products exported to traditional regional markets**

There is potential to increase the variety of dairy products exported to traditional markets and explore new export opportunities. Building on established trade links, there may be opportunities to increase exports of other dairy products – such as flavoured milk, yoghurt and ice cream – to Gulf countries and Central Asia. There may also be potential to expand exports of other dairy products, such as cheese and ghee, to Afghanistan.

- **Explore new export markets beyond traditional regional markets**

The local dairy industry could focus on developing exports to South-East Asia and China, where there is growing demand for dairy products. This would require an understanding of these markets, and their regulations and consumer preferences, as well as the development of effective marketing strategies and supply chain infrastructure to support exports. Additionally, investing in R&D to innovate and create new value-added dairy products could help Pakistani exporters differentiate themselves in competitive international markets.

- **Increase market penetration in the United Kingdom of Great Britain and Northern Ireland**

With its large Pakistani diaspora, the United Kingdom has historically been an important market for Pakistani dairy exports. The dairy industry has been successful in meeting the Pakistani diaspora's demand by providing a range of dairy products such as paneer and ghee. Other dairy products such as yoghurt, cheese and butter are also exported to a lesser extent. The United Kingdom market presents opportunities for these products and other dairy products such as powdered milk and flavoured milk. To tap into the full potential of this

demanding market, the local dairy industry may need to focus on further improving the quality of its dairy products, as well as building stronger relationships with United Kingdom importers and retailers.

Long term: Expand into high-income markets

Longer-term opportunities for the Pakistani dairy industry could involve expanding into high-income markets, such as the European Union and North America, where consumers are willing to pay a premium for high-quality dairy products. These markets often have stricter regulations and higher quality standards, which can present a challenge for Pakistani dairy producers. With the right investment in technology and infrastructure, Pakistani producers can meet these standards and gain a foothold in these markets.

There is a growing trend among consumers in high-income countries towards natural and organic products, which could present an opportunity for Pakistani dairy producers.

Table 7: Potential market and product development strategies

Target market	Segment	Products	Why?	How?
Domestic market	• Retail outlets • Supermarkets	• Packaged UHT milk	• Progressive shift towards packaged milk • The anticipated ban on sales of loose milk will inevitably stimulate packaged milk sales in the country • Growing health concerns regarding open milk • Longer shelf life compared with open milk	• • Strengthen milk collection networks **(PoA activity 3.2.4.)** • Ensure food safety-certified products **(PoA activities 3.1.3., 3.1.4. and 3.1.7.)** • Undertake promotional campaigns on the benefits of UHT milk **(PoA activity 3.1.2.)**
Domestic market	• Retail outlets • Wholesalers • Supermarkets	• Other value-added packaged dairy products (flavoured UHT milk, cheese, cream, yoghurt)	• Growing demand for convenience packaged dairy products, notably in urban areas	• Undertake promotional campaigns **(PoA activity 3.1.2.)** • Develop new products that cater to consumers' preferences and tastes **(PoA activities 3.2.6.)** • Dairy value addition technologies and skill development for SMEs **(PoA activities 2.3.3., 3.3.2., and 3.3.4.)** • Ensure food safety-certified products **(PoA activities 3.1.3., 3.1.4. and 3.1.7.)**
Gulf countries (United Aran Emirates, Qatar, Saudi Arabia, Oman)	• Importers • Distributors • Brokers	Short-term opportunities: • Skimmed and whole milk powder • Ghee • Cheese (including cheddar and mozzarella) • Butter Medium-term opportunities: • Yoghurt • Flavoured milk • Ice creams	• The Gulf region has a large expatriate population from South Asia, and Pakistani dairy products are popular among these communities	• Build a reliable supply chain and strong relationships with Gulf partners • Work with ethnic grocery stores, specialty food stores, and online retailers that cater to Asian communities • Ensure quality and affordability

Central Asia (Kazakhstan, Uzbekistan, and Tajikistan)	• Importers • Distributors • Wholesalers	Short-term opportunities: • Skimmed and whole milk powder • Ghee and butter • Cheese (cheddar, mozzarella and paneer) Medium-term opportunities: • Yoghurt • Cream • Flavoured milk	• Possibility to transport dairy products overland through Afghanistan • These countries are landlocked and rely on imported dairy products to meet their domestic demand	• Comply with the regulatory and quality standards requirements • Improve the quality and safety of dairy products • Promote exports through trade fairs and other marketing efforts
Afghanistan	• Importers • Wholesalers • Retailers	Short-term opportunities: • Milk powder Medium-term opportunities: • Cheese • Ghee • Yoghurt	• Neighbouring country with the possibility to transport overland at reduced costs • Large population that relies on imported dairy products to meet its domestic demand	• Comply with regulatory and quality standards requirements • Promotional campaigns, trade fairs, etc.
China	• Importers • Distributors	• Milk powder • Cheese • Butter • Yoghurt • Ice cream	• China is the world's largest importer of dairy products and growing demand for high-quality dairy products • Local exporters can benefit from the China–Pakistan Economic Corridor initiative that aims to improve infrastructure and trade links between Pakistan and China	• Ensure that products have strict food safety and quality standards • Tailor products to meet Chinese consumer preferences, including in terms of quality, packaging and marketing • Invest in marketing and promotion to build brand awareness
Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Singapore, Thailand and Viet Nam)	• Importers • Distributors	• Milk powder • Butter • Cheese • Flavoured milk • Yoghurt • Dairy-based snacks	• Large and growing population with increasing disposable income • Demand for dairy products is on the rise	• Produce high-quality dairy products at a lower cost • Meet the strict food safety and quality standards • Navigate complex regulations and import requirements that vary by country
United Kingdom	• Brokers • Distributors • Wholesalers	Short-term opportunities: • Cheese (paneer) • Ghee Medium to long-term opportunities: • Cheese • Yoghurt • Milk powder • Flavoured milk	• Popular products among the large Pakistani diaspora in the United Kingdom, used in a range of dishes • Existing market and established trade relationships between Pakistan and the United Kingdom	• Comply with strict regulatory requirements and quality standards • Target ethnic grocery stores and specialty stores • Develop a reliable and efficient supply chain • Highly competitive market
North America (United States, Canada)	• Importers • Distributors • Brokers	• Flavoured milk / dairy beverages • Cheese • Butter	• Target ethnic communities with roots in South Asia and the Middle East	• Comply with strict food safety regulations and quality standards • Build a reliable supply chain and strong relationships with North American-based partners • Highly competitive market

Implementation modalities and quick wins

The Dairy Sector Development Strategy is not the strategy of any specific institution. Rather, it is the strategy of Sindh, which endeavours to leverage the dairy industry to contribute to overall economic growth in the province. Nevertheless, a strategy is not enough to ensure the sector's sustainable development. Such development will require elaboration and coordination among various stakeholders for different activities. While the execution of these activities will allow the Strategy's targets to be achieved, success will depend on the ability of stakeholders to plan and coordinate actions in a tactical manner. Successful Strategy implementation, therefore, would require the following:

- A high level of commitment from relevant stakeholders
- Systematic coordination and communication between implementing bodies
- The readiness of the public and private sectors to allocate / mobilize resources.

Setting up the governance framework – Livestock Development Council

To achieve success and ensure the continuing viability of the Strategy, it is crucial to identify and create a reliable system that will facilitate its implementation. Having an effective institutional mechanism to oversee and coordinate the execution of the Strategy will help clarify everyone's roles, make the most of scarce resources, assign responsibilities and accountability, and promote transparency among public institutions and private sector organizations.

For implementation of the Dairy Sector Development Strategy, it is recommended that DoLF establishes the LDC (or similar) as part of the Livestock Policy governance structure to provide financial, operational and technical support. It is also recommended that certain members of the LDC are a part of the federal sector-specific council created under the aegis of the Trade Development Authority of Pakistan and the Ministry of Commerce, Government of Pakistan, and as part of the Strategic Trade Policy Framework.

Dairy sector subcommittee

A dairy sector subcommittee will be established under the LDC. This formal dialogue platform will require high-level involvement by members from the public and private sectors. Their role is crucial and will influence the effectiveness of Strategy implementation. It is recommended that one of the Chairs be from the private sector and the other from the government to consult on key trade thematic areas ranging from policy to regulations and trade negotiations.

The core team consulted during the Strategy's design process was composed of a panel of representatives from key institutions, involving ministries as well as representatives of the private sector. Once its mandate is appropriately adjusted, this group of stakeholders – together with additional human resources as required – is best positioned to serve in the dairy sector subcommittee.

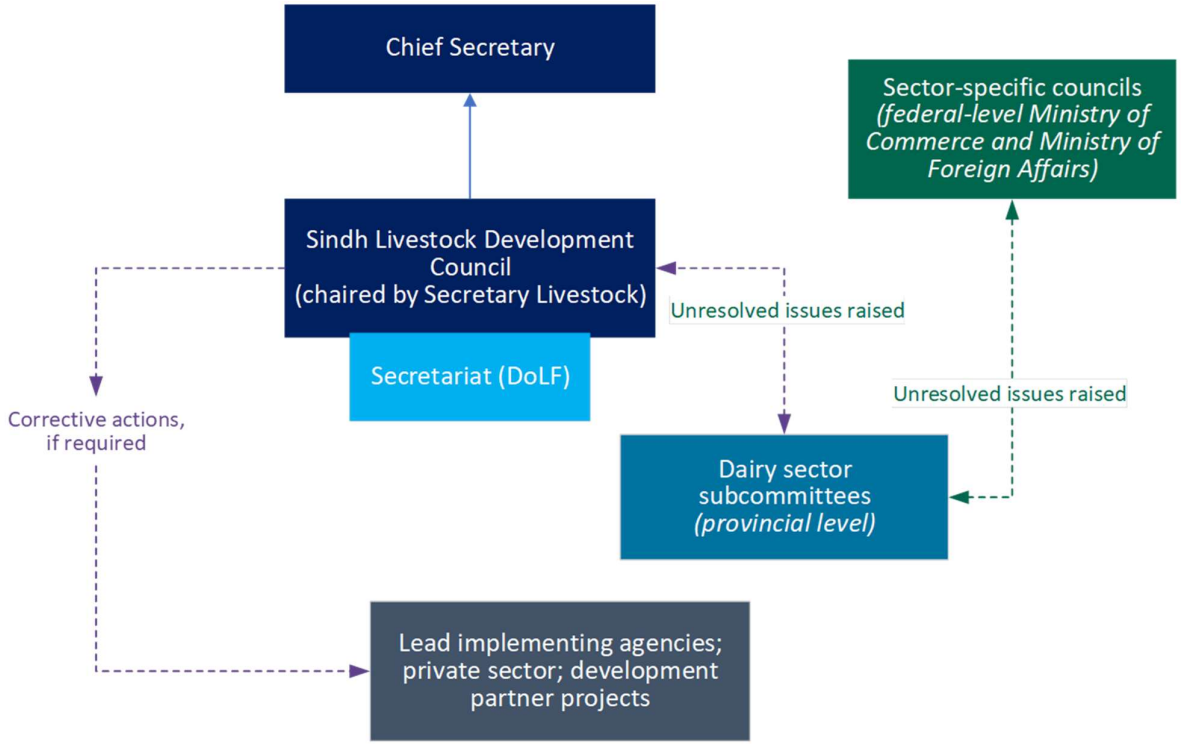
The dairy sector subcommittee will meet quarterly and implement the following functions:

- Act as a consultative group in matters pertaining to the dairy sector, enabling the private sector and government representatives to identify priority issues
- Coordinate and monitor implementation of the Strategy by the government, private sector, institutions or international organizations to ensure it is on track
- Identify and recommend allocation of the resources necessary for Strategy implementation
- Elaborate and recommend revisions and enhancements to the Strategy so that it continues to best respond to the sector's needs and long-term interests
- Propose key policy changes to be undertaken based on strategic priorities, and promote these policy changes among national decision-makers
- If Strategy implementation requires adjustment to achieve the expected results, the dairy sector subcommittee will have the responsibility to undertake all corrective measures.

Specific tasks falling under these broad areas of activities include:

- Formulate project proposals, including budgets, for implementation of Strategy activities
- Develop annual and twice-yearly work plans for approval by the LDC
- Collect information from project implementation and prepare regular monitoring reports to be submitted to the LDC.

Figure 15: Proposed institutional framework for dairy sector development



The LDC will be established in line with the recommendation in the Livestock Policy to monitor implementation of the Dairy Sector Development Strategy and share findings with the Secretary of DoLF every quarter. Inputs and outputs will be monitored against the indicators and targets in the PoA. An independent midterm review and evaluation will be carried out by DoLF in coordination with any agencies concerned.

Financial resource mobilization for implementation

While resource mobilization is only part of the solution, it plays a crucial and indispensable role in supporting Strategy implementation. An integrated resource mobilization plan should be elaborated as soon as the Strategy is adopted. Resource mobilization involves planning the sequencing of communications with donors, project design, project proposals / applications, and resource collection and management. This should facilitate, leverage and strengthen the impact of diverse financial sources – national resources, development aid and private investment – to support sustainable and inclusive implementation.

- **National resources directly from budget and support programmes:** The government will need to validate defined minimum budget support for Strategy implementation. Such support for Strategy activities will demonstrate the government's commitment to the initiatives.
- **Alignment of donor support and interventions with the Strategy:** The sector forum and authorities will need to capitalize on the significant momentum gained as part of the Strategy design process and leverage it for smooth and efficient implementation. International development agencies can use the Strategy as the logical framework for their programmes – benefits from the favourable conditions for the operation could include political endorsement, private sector buy-in and improved collaboration with national institutions. The PoA should serve the sector forum as well as national institutions to improve communication and facilitate the negotiation, planning, coordination and evaluation of commitments made in the context of development aid, especially through the development of programmes and project proposals aligned with the Strategy's priorities.
- **National and foreign investment:** The current Strategy design core team is composed of representatives of national institutions, the trade and investment support network and the private sector. If the sector forum becomes the coordinating body, the Strategy should benefit from a solid channel of communication capable of conveying reliable information to companies about export-related opportunities in the industry, and to the government on the needs that investors have identified to operate successfully. Investment in Sindh could serve as a valuable driver of export development. Even so, it must be targeted at specific prospects to benefit the industry's development.

The various implementation modalities detailed above will determine the success of Strategy implementation. However, high-level support from the government combined with strong championship by the business sector will be the real driver of successful Strategy implementation.

Recommended 'quick wins' for year one implementation

The following activities have been identified by stakeholders as having high priority and high return and are therefore recommended for implementation in the first year. The objective of the activities in the first year is to establish a solid foundation for full Strategy implementation.

Policy and regulatory activities

SFA: Introduce a Sindh Dairy Produce Act to make provisions for the regulation of the manufacturing, marketing and export of dairy products, including for the registration and control of premises engaged in manufacturing such products in Sindh. **PoA activity 1.1.2.**

Provincial Assembly of Sindh: Ensure that milk prices consider rising production costs for farmers, making dairy farming a profitable business and attracting investment in the sector. One way to achieve this could be through the removal of fixed prices of fresh milk by District Officers (**PoA activity 1.1.3.a**). Alternatively, dairy farmers, including small rural farmers, could be involved in the decision-making process that determines milk prices at the district administration level. **PoA activity 1.1.3.b**

Institutional framework

DoLF:

- Establish the LDC comprising three subcommittees – dairy, meat and leather – to guide sector development and oversee the implementation of the Sindh dairy, meat and leather sector development strategies. **PoA activity 1.1.1.**
- Conduct a survey on the dairy sector in Sindh to register and map the different actors involved in the milk supply chains throughout the province and identify the coexisting dairy production zones and dairy production systems. This will facilitate evidence-based decision-making and planning. **PoA activity 1.3.2.**

Quality and skills

SAU: Develop and conduct a modular training programme targeting rural smallholders and women dairy farmers' groups on dairy farm management. **PoA activity 2.3.1.**

SFA: Develop and disseminate milk collection guidelines and standard operating procedures in local and simple languages (Urdu and Sindhi) so collection points and centres can meet PSQCA standards. **PoA activity 3.2.3.**

SAU / SBBUVAS: Undertake continuous skill and competency development on breeding practices and technologies, including AI technology and embryo transfer technology. The targeted audience includes veterinary graduates, DoLF staff, breeding associations and private technicians. **PoA activity 2.1.5.**

The Plan of Action

The PoA presented in the section below responds to the vision by addressing the sector's constraints and by leveraging opportunities in a comprehensive manner through a robust, actionable and realistic set of activities. The PoA is structured around the above-mentioned strategic objectives – agreed upon with all sector stakeholders – and constitutes the heart of this Strategy.

For each objective, the PoA outlines detailed activities and their implementation modalities, which include:

- **Priority level:** Priority 1 being the highest and 3 the lowest.
- **Period:** The desired time frame of the activity
- **Project or reform:** Defines whether the activity entails a legal action
- **Targets:** Quantifiable targets that allow completion monitoring of the activity during the implementation stage
- **Leading implementing partner**: One single accountable lead institution per activity. The institution can have a technical role or can have solely an oversight and coordination role
- **Supporting implementing partners:** Any institution that should be involved at any stage of the activity's implementation
- **Estimated cost:** The cost of implementing the activity for the planned five years

Activities highlighted in green are of high priority and recommended for immediate implementation.

Plan of Action for the Dairy Sector Development Strategy, Sindh, 2023–2027

Strategic objective	Operational objective	Activity	Priority (1=Highest)	Period					Targets	Leading implementing partner(s)	Supporting implementing partners
				2023	2024	2025	2026	2027			
1. Foster animal disease prevention and private sector development, supported by informed regulatory decision-making	**1.1. Harmonize and strengthen the legal and regulatory framework, making it conducive to private sector development**	1.1.1. Establish the LDC, comprising three subcommittees – dairy, meat and leather – to guide sector development. The Council and its subcommittees should take the form of public–private dialogue platforms, including academia, and oversee the implementation of the Sindh dairy, meat and leather sector development strategies. *Meat Strategy Activity 1.1.6.* *Leather Strategy Activity 1.3.1.*	1						• LDC and its subcommittees established by 2024	DoLF	• DoIC • Animal Quarantine Department (AQD) • PSQCA • SFA • PDA • DCFA
		1.1.2. Introduce a Sindh Dairy Produce Act to make provisions for the regulation of the manufacturing, marketing and export of dairy products, including for the registration and control of premises engaged in manufacturing such products in Sindh. The Act should include a provision regulating the sale of raw milk in a controlled environment at a temperature not exceeding 4°C. This provision should be introduced through a phased approach, starting with a pilot project at the district level, with the required cold chain system in place.	1						• Sindh Dairy Produce Act enacted • Regulation on raw milk temperatures introduced • Pilot project to regularize raw milk sale is launched and fully functional by 2026 in at least five urban districts	SFA	• Provincial Assembly of Sindh • DoLF • DoASP • PSQCA • Health Department • Law and Parliamentary Affairs Department • DoIC
		1.1.3.a. Remove 'fresh milk', 'powdered milk', and 'milk for infants' from the list of essential commodities as defined under the *Sindh Essential Commodities Price Control and Prevention of Profiteering and Hoarding Act, 2005* so that these commodities will no longer be subject to the fixation of prices by District Officers, as currently stipulated under the Act.	1						• 'Fresh milk,' 'powdered milk,' and 'milk for infants' removed from the list of essential commodities	Provincial Assembly of Sindh	• DoASP • DoLF
		1.1.3.b. If the price capping on dairy products still needs to be removed (see Activity 1.1.3.a.), establish a technical committee headed by the *Taluka / Tehsil* Municipal Administration and comprising dairy farmers, DoLF and consumer representatives to determine milk prices at the district administration level.	1						• Technical committees established	*Taluka / Tehsil* Municipal Administration	• DoLF • Law and Parliamentary Affairs Department • Ministry of Commerce • DCFA • PDA

	1.2. Foster efficient management and control of TADs and improve livestock traceability	1.2.1. Identify, notify and develop animal disease control zones and compartments in line with World Organisation for Animal Health guidelines and operated by private operators. • Phase 1: Undertake a pilot animal disease control compartment initiative by creating a quarantine zone for all livestock on the parameters for compulsory vaccination and post-vaccination lairage before allowing fully vaccinated and rested animals in the disease-free compartment. A complete cold chain system with refrigerated facilities and transportation from vaccine production units – or ports for imported medicine – to processors shall also be established. • Phase 2: Identify, notify and develop additional animal disease control compartments, including implementation of an animal identification and tagging system. *Initiative to be undertaken through a PPP joint venture model with a licence to special purpose vehicle companies under section 42 of the* Companies Act, 2017. *Meat Strategy Activity 3.1.2.*	1						• Pilot animal disease control compartment developed by the end of 2024 • At least five animal disease control compartments developed by the end of 2026 • At least two animal disease control zones identified and notified by 2027	DoLF and the private sector (PPP joint venture model)	• Provincial Assembly of Sindh • Transport and Mass Transit Department • National Logistics Cell • AQD • National Veterinary Laboratory, MNFSR
		1.2.2. Launch a call for tenders to establish private vaccine and medication production lines in line with international standards and adapted to local conditions to ensure affordable and efficient supply to all farms in Sindh. *This production line is to be established through a licence to a corporate processor under section 42 of the* Companies Act, 2017*, with long-term management control of the corporate entity and funding support (and a board of directors with representatives from GoS). GoS is to provide the basic material and protocols.* *Covered in the Sindh Livestock Policy* *Meat Strategy Activity 3.1.1.*	1						• At least one production line operationalized by 2025	Sindh Public Procurement Regulatory Authority (SPPRA)	• SIAH • PDA • Meat processors-cum-exporters
		1.2.3. Establish an autonomous epidemiology and infectious disease control authority to monitor surveillance of infectious disease outbreaks and be responsible for animal-related vaccination and medicines supply to improve reaction time in case of outbreaks. ***Note:*** The Sindh Animal Disease Control Act, 2022 provides for the establishment of a Sindh animal disease control authority. *Meat Strategy Activity 3.1.3.*	2						• Authority established and operationalized by 2024	DoLF	• SIAH • AQD

		1.2.4. Undertake public awareness and advocacy campaigns about TADs and the benefits of vaccination. *Meat Strategy Activity 3.1.5.*	1							• Awareness-raising campaign conducted	DoLF	• SAU • SIAH • Information, Science and Technology Department
		1.2.5. Establish distribution channels for vaccines and cattle AI with cold chain equipment: • Conduct a needs assessment to identify the specific cold chain equipment requirements. • Develop a plan for procurement and distribution of cold chain equipment, including purchasing or leasing liquid nitrogen transportation and storage containers, refrigerator cold chain systems, etc. • Establish a distribution network that includes the placement of cold chain equipment at key distribution points, such as veterinary offices, community health centres and livestock markets. • Train personnel responsible for handling and maintaining cold chain equipment. *Meat Strategy Activity 3.2.5.*	1							• Efficient and effective distribution system established, ensuring access to vaccines and AI equipment with cold chain equipment	Health Department	• Planning and Development Department • DoLF • Transport and Mass Transit Department • Information, Science and Technology Department • Private sector
		1.2.6. Create and deploy a mobile / outreach vaccination and animal health services team to deliver vaccine and veterinary services to remote and rural communities.	1							• At least five mobile vaccination and animal health services teams deployed by the end of 2025	DoLF	• SIAH • Local governments (local district governments; *Taluka / Tehsil* Municipal Administration)
		1.2.7. Introduce a basic tagging system for the identification and registration of animals through a compartmentalization approach: • Phase 1: Develop a uniform software solution for animal registration and identification and introduce the mandatory tagging of all newborn calves for disease-free compartments. • Phase 2: Adopt mandatory tagging for disease-free compartments and zones. Tagging and vaccination can be jointly undertaken. *Meat Strategy Activity 3.1.7.*	1							• The identification by farmers of all newborn calves with a tag set in disease-free compartments to become a legal requirement by 2025 • 25% of animals tagged per year, starting 2025 (for animals outside animal disease control compartments and zones through a phased approach)	DoLF	• AQD • Information, Science and Technology Department • National Database and Registration Authority • Pakistan Software Houses Association for IT and ITES • DCFA • PDA • Meat processors-cum-exporters

	1.3. Ensure the availability of reliable livestock data across the value chain	1.3.1. Conduct a livestock census across the province every five years to collect basic statistics on livestock population and production at every possible administrative and geographic level (particularly the district level), including registering farm households and slaughter facilities. *Census to be conducted with the consent of DoLF, to coordinate and ensure inter-departmental cooperation.* *Meat Strategy Activity 1.2.1.*	1					• Provincial livestock census conducted by the end of 2024	Sindh Bureau of Statistics	• DoLF • Planning and Development Department • DCFA • Local governments • National Database and Registration Authority
		1.3.2. Conduct a survey on the dairy sector in Sindh to: • Register and map dairy farms, selling points, milk collectors, traders, and processors through a data record system • Identify the different dairy production zones and dairy production systems that coexist in Sindh and analyse their respective supply chains and specific needs.	1					• Survey conducted and data record system established	DoLF	• Sindh Bureau of Statistics • Planning and Development Department • DoLF • Local governments • DCFA • PDA
2. Enhance milk production through increased productivity	**2.1. Optimize the genetic potential of dairy animals**	2.1.1. Establish a laboratory of animal genetics and breeding for genetic mapping and genetic marker-assisted selection for livestock breeding. Use DNA markers associated with milk and meat production traits to rapidly identify and select superior native breeds (e.g. Red Sindhi Cows and Kundhi Buffaloes) for inclusion in breeding programmes. The initiative should include the creation of a gene bank for the preservation of genetic material. *Meat Strategy Activity 2.2.1.*	1					• Red Sindhi and Kundhi with higher milking potential identified and registered • At least 50 progeny-positive bulls identified and semen commercially available by the end of 2027	Directorate of Animal Breeding, DoLF	• SAU • SBBUVAS • PCSIR • Pakistan Agricultural Research Council • Breeder associations
		2.1.2. Based on a needs assessment, implement a provincial AI programme to improve the genetic potential of nondescript local breeds through cross-breeding with better quality semen. The programme should include the following components: provision of improved genetics to dairy and beef farmers through inseminations; • Conduct training for AI technicians in AI services • Conduct awareness-raising campaigns on breeding practices to discourage cross-breeding of identified indigenous breeds and preserve the genetic pool for existing cattle populations and biodiversity.	2					• 5,000 farmers reached in 100 villages per year • At least 2,000 doses inseminated, with 30 AI technicians trained in AI services	Directorate of Animal Breeding, DoLF	• SIAH • SAU • SBBUVAS

		The first phase would be a pilot project in two rural upper and lower Sindh districts. A separate peri-urban pilot project in Karachi or Hyderabad could also be launched. *Meat Strategy Activity 2.2.6.*									
		2.1.3. Based on a needs assessment, modernize and upgrade the buffalo and cow reproduction and breeding research centres, including but not limited to: • Livestock Development and Research Farm for Kundhi Buffaloes, Rohri • Livestock Experimental Station, Nabisar Road (for Thari Cattle) • Red Sindhi Cattle Breeding Farm, Tando Muhammad Khan • Animal Science Complex Korangi, Karachi.	2						• Needs assessment conducted by 2024 • Breeding research centres upgraded to international standards by 2027	Directorate of Animal Breeding, DoLF	• SIAH • SAU
		2.1.4. Launch expressions of interest to upgrade / modernize the three public SPUs established in Sindh for beef and dairy breeds and increase their capacities. *SPUs could be operated through PPPs, with GoS playing an oversight and regulatory role. The functions and powers to manage, operate and maintain these units should be progressively transferred to private operators.* *Meat Strategy Activity 2.2.4.*	1						• SPUs upgraded to international standards by 2026 • Functions and powers to operate public SPUs transferred to the private sector	Directorate of Animal Breeding, DoLF	• SIAH • Sindh PPP Unit • SPPRA • PDA • Meat processors-cum-exporters
		2.1.5. Undertake continuous skill and competency development on breeding practices and technologies, including AI technology and embryo transfer technology. The targeted audience includes veterinary graduates, DoLF staff, breeding associations[6] and private technicians. *Training courses could be conducted within the Department of Animal Breeding and Genetics, Faculty of Animal Husbandry and Veterinary Sciences (AHVS), SAU, and the Department of Animal Breeding and Genetics, Faculty of Animal Production and Technology, SBBUVAS. The capacities of these departments should be assessed and strengthened accordingly.* *Meat Strategy Activity 2.2.5.* *Sindh Livestock Policy activity*	1						• Training institute established by 2025 • 1,000 technicians trained per year	SAU / SBBUVAS	• Directorate of Animal Breeding, DoLF • SIAH • PDA

[6] Six associations have established to date, namely, Kundi Breed Conservation and Improvement Association; Red Sindhi Breed Conservation and Improvement Association; Thari Breed Conservation and Improvement Association; Kankrej Breed Conservation and Improvement Association; Kamori Goat Breed Conservation and Improvement Association; Pateri Goat Breed Conservation and Improvement Association.

		2.1.6. Support academic research and extension in modern animal reproduction, breeding and genetic techniques (particularly AI), including scholarships and research grants to local researchers for training at identified best research institutes, and to foreign experts to train local students and technicians. *Sindh Livestock Policy activity*	2	• At least two international partnerships signed by 2025 • 30 local researchers benefiting from research grants each year • At least five international faculties supported to design courses and training 250 selected students in advanced reproduction technology at SAU / SBBUVAS by 2027	Universities and Boards Department	• DoLF • SAU • SBBUVAS • Sindh Higher Education Commission • PDA • Meat processors-cum-exporters
	2.2. Promote better nutrition for dairy animals	2.2.1. Introduce a PPP initiative in quality fodder seed production through a memorandum of understanding with selected farmers determining the type of fodder to be cultivated, the area under cultivation, the quality of seeds to be produced and the procurement price. The initiative shall include training farmers on fodder cultivation and fodder seed production. Testing, cleaning, packing and distribution shall also be ensured. A pilot project could be implemented using irrigable land allocated to SAU for research. *Meat Strategy Activity 2.1.4.*	1	• 100 farmers enrolled under the memorandum of understanding and supplying fodder seeds • At least 200 acres maintained for fodder seed production under the programme	DoASP	• DoLF • PCSIR • PSQCA • SEDF • Sindh PPP Unit • SPPRA • SAU
		2.2.2. Develop a plan for fodder production on the left bank of the Indus River, aimed at supporting private operators with prospects for growing grazing pastures and silage crops through: • The provision of soft terms for the long-term lease of irrigated lands (with access to primary transport infrastructure) • Exemption from land revenue and agricultural income tax. *Meat Strategy Activity 2.1.2.*	2	• Programme launched • Number of hectares of irrigated land leased (to be defined by GoS)	DoLF	• Irrigation Department • Planning and Development Department • Investment Department • DoASP • Transport and Mass Transit Department • DCFA

								• PDA • Meat processors-cum-exporters
		2.2.3. Promote the adoption of animal feed production technologies and techniques by introducing matching grants and technical assistance to private operators. Activities to be covered include: • Hay and silage making • Pelletized feed and total mixed ration formulation and production[7] • Climate-smart, drought-resistant, high protein, high-yield, non-GMO, perennial fodder production and preservation (including soybean, alfalfa, canola and maize). *GoS is to play an oversight and regulatory role.* *Meat Strategy Activity 2.1.1.*	1					• Programme launched • Grant mechanism introduced • At least 10 commercial silage production units established for large and small farms by 2027	Finance Department	• DoLF • Investment Department • DoASP • DCFA • PDA • Meat processors-cum-exporters
		2.2.4. Based on a needs assessment, develop and publish PPP tenders for establishing feed mills at the divisional level in rural Sindh. *Feed mills are to be operated by private operators, with GoS providing basic infrastructure and regulations.* *Meat Strategy Activity 2.1.3.*	2					• At least 20 feed mills established in priority areas by the end of 2025	SPPRA	• DoLF • Investment Department • SEDF • Sindh PPP Unit • PDA • DCFA • Meat processors-cum-exporters
		2.2.5. Create a Sindh fodder research institute within the Faculty of Crop Production, SAU to develop climate-smart, high-nutritive and high-yield perennial fodder seeds and low-cost organic feed and balanced rations for local production. *Institute to be established through a joint venture with PCSIR and private meat and dairy processors, to be linked for proximate fodder analysis with animal nutrition laboratories in SAU or SBBUVAS.* *Meat Strategy Activity 2.1.5.*	2					• Sindh fodder research institute created and operationalized • At least two improved fodder seed varieties produced locally, and commercially available by 2027	SAU	• SBBUVAS • PCSIR • DoASP • DCFA • PDA • Meat processors-cum-exporters
		2.2.6. Identify government-owned rangelands suitable for grazing, and rehabilitate them using re-seeding and rotational grazing management. The lands should then be handed over or leased to farmers and private firms for their livestock.	3					• Number of hectares of land rehabilitated and leased for livestock grazing (to be defined by GoS)	DoLF	• Planning and Development Department • DoASP • Forest Department • Irrigation Department

[7] To be developed in line with the Pakistan Standard Specification for Balanced Feed Mixture for Livestock (1st Revision) reference 234-2016.

														• Sindh Board of Revenue • Land Utilization Department
		2.2.7. Undertake capacity-building activities for livestock farmers' communities on sustainable pasture and rangeland management practices, including rotational grazing practices.	2								• 1,200 farmers trained per year (involving 30 participants per training session)	SAU	• DoLF • Local NGOs • Training institutes
		2.2.8. Appoint designated animal nutritionists who are capable of guiding farmers about animals' nutritional requirements, to cover public civil veterinary hospitals at the district level.	1								• One animal nutritionist appointed in every district by 2025	DoLF	• SIAH
	2.3. Improve dairy farm management and promote sustainable practices	2.3.1. Develop and conduct a modular training programme targeting rural smallholders and women's dairy farmer groups on dairy farm management, including: • Forage production • Animal nutrition and health • Fertility management • Young stock management • Manure management • Hygienic milk production • Marketing management.	1								• Six-month training courses developed • 1,500 farmers trained per year (of which at least 50% are women) at 50 locations (involving 30 participants at each location)	SAU	• DoLF • SBBUVAS • Sindh Higher Education Commission • DCFA • PDA • Local NGOs
		2.3.2. Increase female representation in veterinary practices to allow rural female farmers to have local female technicians to consult through the introduction of: • A gender quota system for veterinary science graduates • Scholarships for PhD students to conduct research projects on productivity and gender mainstreaming in dairy value chains.	1								• At least 200 women veterinarians and veterinary technicians trained per year • Five scholarships granted for PhD students to research gender mainstreaming	Sindh Higher Education Commission	• SAU (Institute of Veterinary Science) • SBBUVAS • SIAH • DoLF • Pakistan Veterinary Medical Association • Sindh Technical Education and Vocational Training Authority • Local NGOs • Training institutes • PDA

		2.3.3. Develop a low-cost rental service for dairy farm equipment (including tractors, tanks, pasteurizers, separators, homogenizers, etc.), also accessible online. *Under the scheme, the government will import – or procure locally, when possible – farming equipment and provide such machinery to rural districts via custom hiring centres. Dairy equipment courses will also be provided. Through PPP mechanisms, hiring centres could be operated by cooperatives or private operators.*	2						• Rental service introduced • At least 1,000 farmers benefiting from the programme by 2027	DoASP	• DoLF • International machinery manufacturers • DCFA • PDA
		2.3.4. Advocate the introduction of financial products and services that cater to the needs of smallholder livestock farmers: • Identify relevant financial institutions, government agencies and farmer associations • Build a compelling case highlighting its benefits, such as increased productivity and improved livelihoods • Engage with policymakers and financial institutions to promote such financial products and services • Create awareness among dairy smallholders about financing solutions through outreach programmes, training sessions, etc.	1						• Financial products and services introduced by 2025	LDC (to be established)	• DoLF • DoASP • DCFA • FDA • Local NGOs • Agricultural Development Bank of Pakistan • Zarai Taraqiati Bank Limited • Other relevant financial institutions
		2.3.5. Introduce a livestock insurance scheme providing a protection mechanism against any eventual loss of farmers' registered bovine animals due to accidents and natural disasters. Under the scheme, cattle and buffaloes are insured at their current market price with up to 30% of the insurance premium subsidized by the provincial government. The scheme could be implemented on a pilot basis for five years in five districts.	2						• Livestock insurance scheme introduced by 2024	State Bank of Pakistan	• DoLF
		2.3.6. Develop and publish PPP tenders for the conversion of manure (biomass) to biogas, including the following activities: • Collect and transport manure within a target area • Treat manure to produce biogas at a biogas production plant • Establish solar-powered manure separation units • Convert the biogas into compressed biogas • Market the residual digested bio-slurry as a fertilizer • Provide a tax refund for large installations to produce fertilizer. *Meat Strategy Activity 3.2.6.*	3						• At least 10 projects supported by 2027	Energy Department	• Private sector • DoLF • Investment Department • Environment, Climate Change and Coastal Development Department • Irrigation Department • DoASP • Sindh PPP Unit • SPPRA

		2.3.7. Introduce a renewable energy support scheme in the livestock sector through grants to support operators installing solar and wind energy systems and converting transportation fleets to biogas or electric / fuel hybrid. *The scheme could be included in the Sindh Solar Energy Project managed by the Energy Department.*[8] *Meat Strategy Activity 3.2.7.*	3					• At least 10 projects supported by 2027	Energy Department	• Finance Department • DoLF • Investment Department • Environment, Climate Change and Coastal Development Department • PDA • DCFA • Meat processors-cum-exporters
3. Ensure the production of safe and high-quality milk and promote value addition	**3.1. Improve food safety and quality management along the supply chain**	3.1.1. Following a phased approach, develop and implement a minimum pasteurization law to improve the quality of fresh milk and gradually phase out fresh milk from the market. • Phase 1: The sale of raw unpasteurized milk will not be allowed in a specific area of Karachi under a pilot programme. • Phase 2: Taking into account feedback from the pilot area, the law is enforced across all areas of Karachi • Phase 3: The law applies to all regions of the province.	2					• Minimum pasteurization law enacted • Pilot programme launched by the end of 2024	Provincial Assembly of Sindh	• DoLF • LDC (to be established) • SFA • PSQCA • Law and Parliamentary Affairs Department
		3.1.2. Undertake outreach activities and awareness campaigns to the general public to promote quality and safe milk consumption, and educate consumers on the hazards of loose milk and home pasteurization of raw milk.	1					• Provincial awareness campaign launched by 2024	Health Department	• SFA • DoLF • PDA • DCFA • AHVS (SAU), Department of Animal Product Technology
		3.1.3. Introduce legal requirements for dairy product labelling and packaging to: • Ensure that the packaging is safe for consumer health and the environment, with content that corresponds with the indicated quantity on the label in weight or volume • Enable consumers to access comprehensive information about the content and composition of the product, including net quantity, nutritional information, an indication of origins, date of production, best before date, lot / batch number etc.	1					• Legal packaging and labelling requirements introduced and enacted	SFA / PSQCA	• DoLF • SBBUVAS • AHVS (SAU), Department of Animal Product Technology

[8] More information available from https://ssep.gos.pk/organization-approach/

		3.1.4. Implement a support programme to accompany dairy farms in obtaining food safety and quality management certifications, including Global Good Agricultural Practices, Hazard Analysis Critical Control Points, ISO Food Safety Management System 22000, and Pakistan standards on dairy products.	2						• At least 500 companies certified through the programme per year	SFA / PSQCA	• Small and Medium Enterprises Development Authority • DoLF • DFCA • PDA
		3.1.5. Establish a specialized food testing laboratory at SFA.	2						• SFA food testing laboratory established by 2024	SFA	• Finance Department
		3.1.6. Carry out continuous capacity building and enhancement of the food inspection services and appoint / recruit veterinarians and meat / dairy technologists.	1						• 250 SFA staff trained per year • At least 750 veterinarians and meat / dairy technologists appointed each year	SFA	• PSQCA • National Animal and Plant Health Inspection Service SAU • SBBUVAS
		3.1.7. Adopt quality control measures for marketed milk – both raw milk and pasteurized milk – in the smallholder supply chain at the different critical control points along the milk collection chains, including: • Milking at the farm level • Bulking milk at collection points • Transportation • Milk processors and collectors' facilities • Cooling tanks. *The LDC would support implementing quality control at registered producers / cooperatives.*	1						• Quality control system introduced by the end of 2024 • Pasteurization guidelines developed and disseminated	SFA	• LDC (to be established) • Cooperatives • DoLF
	3.2. Optimize the milk supply chain and enhance market links	3.2.1. Promote the development of dairy farmer cooperatives and milk producer group centres in villages through grants to support equipment (i.e. building, cooling tanks with power supply, milk testing equipment, milk cans), training and advisory and support services. Conduct a provincial campaign for the promotion of cooperatives and trust-based cooperative relationships through mass media (television, radio, newspapers and social media).	2						• 200 milk producer groups / cooperatives established by 2027 • Awareness-raising campaign conducted	DoLF	• DoASP • Commercial banks • PDA

		3.2.2. Review and revise the *Sindh Co-operative Societies Act, 2020* through a technical committee comprising legal advisers and farmers / livestock stakeholders. The revised Act should fully empower the elected cooperatives' members with livestock-specific requirements.	2					• *Sindh Co-operative Societies Act, 2020*, revised	DoLF	• Law and Parliamentary Affairs Department • Private sector
		3.2.3. Develop and disseminate milk collection guidelines and standard operating procedures in local and simple languages (Urdu and Sindhi) so collection points and centres can meet PSQCA standards.	1					• Milk collection guidelines and standard operating procedures developed and disseminated	SFA	• PSQCA • DoLF • SAU • SBBUVAS • PDA • Local NGOs
		3.2.4. Develop and publish PPP tenders for large dairy farm development and management in the province. Incentivize the establishment of large-scale farms and larger herd sizes through a financing scheme offering long-term loans with zero interest rates for dairy cow breeders.[9]	2					• PPP tenders advertised • Up to five projects supported between 2024 and 2027	DoLF	• SEDF • Private sector
		3.2.5. Attract investment in milk collection and processing in Sindh. • Promote the benefits of investment in milk collection and processing facilities, including increased quality and safety of milk products, improved supply chain efficiency and the potential for higher profitability. • Offer incentives to private investors such as tax breaks, subsidies or low-interest loans.	2					• Number of investment projects conducted (to be defined)	DoLF	• DoIC • SEDF • Investment Department
		3.2.6. Improve access to market information and understanding of the demand for dairy products: • Create social mobilization groups for disseminating knowledge, costs, etc. between farmers, producer groups and market agents • Connect farmers' groups through social media.	2					• Social mobilization groups established	LDC (to be established)	• Trade Development Authority of Pakistan • PDA • DCFA • Information, Science and Technology Department • DoASP • DoIC
		3.2.7. Develop milk-feeding plans for vulnerable and malnourished segments of society, including school milk programmes, milk feed programmes for women, the elderly, and marginalized agriculture and construction labourers. The programme would support farmers in marketing their milk while contributing to food security.	2					• Milk feeding plans elaborated	School Education and Literacy Department	• DoLF • SFA • Milk producer groups / cooperatives • PDA • DCFA

[9] This activity was recommended in Pakistan Business Council (2022).

											• Health Department
	3.3. Support the production and marketing of value-added dairy products	3.3.1. Attract investors to spur local dry milk production through incentives such as tax refunds / breaks for manufacturers. Dried milk powder allows for augmented shelf-life and overcomes the challenges of seasonal demand and supply.	2						• Subsidy mechanism introduced	DoIC	• Investment Department • DoLF • Finance Department • SEDF
		3.3.2. Introduce an adding value grant for dairy products manufacturers / processors, particularly SMEs, to enable them to purchase equipment to process, diversify and add value to their products. This could include premises and equipment for preparing or processing dairy products.	3						• Grant mechanism introduced	SEDF	• DoIC
		3.3.3. Introduce milk vending machines for dispensing chilled milk.	2						• At least 20 milk vending machines introduced in each district by 2025	SFA	• PDA
		3.3.4. Undertake a training programme on value addition in dairy products for farmers' communities, particularly women. Provide hands-on vocational training on dairy value addition, focusing on small rural dairy farmers. Value-added dairy products include but are not limited to skimmed beverages, yoghurt, ice cream, cheese, milkshakes, butter, evaporated milk, condensed milk, *khoya*, whey and butter oil (ghee).	1						• 1,500 farmers trained per year at 50 locations (involving 30 participants at each location)	SAU	• SIAH • SBBUVAS • Local NGOs

Annex 1: Complete list of participants in the public–private consultations

Participant name	Organization	Position
Dr Abdul Manan Khokhar	DoLF	Director, Research
Dr Abdullah Khan	Directorate of Animal Husbandry, Sindh	DG Livestock Extension/Research
Dr Ali Raza Nizamani	Veterinary Research Institute	Senior Research Officer
Dr Amin Ali Solangi	Agriculture Research Centre	Director, Crop Science Research Institute
Dr Arif Memon	DoLF	Senior Research Officer
Dr Hafiz Rub Nawaz	PCSIR Laboratories, Karachi	Director General
Dr Iqbal Memon	Commissioner Office, Karachi	Commissioner, Karachi
Dr Javed Memon	Livestock Department, Hyderabad	
Dr M Ilyas	AQD, Karachi	Director
Dr Muhammad Ali Merchant	Doctor's Dairies and Feeds	Chief Executive Officer
Dr Muhammad Naeem	Department of Livestock Management, AHVS, SAU	Assistant Professor
Dr Nobat Khan Khoso	Directorate of Animal Husbandry, Sindh	Director General / Director Livestock Extension / Research
Dr Shahrood Ahmed Siddiqui	Veterinary Research Institute, Tandojam	Senior Research Officer
Mr Abdul Ahad	Planning and Development Department, Livestock and Fisheries section	
Mr Agha Fakhar Hussain	Sindh Food Authority	Director General
Mr Ajaz Ahmed Mahesar	DoASP	Secretary
Mr Ali Ahmed Khan	PDA	Executive Chairman
Mr Ali Bux Soomro	PSQCA	Director, Conformity
Mr Anas Jameel	Sindh dairy and breeding farm	Director
Mr Asad Baghpati	Al Razzaq Livestock Farms / DCFA	Director
Mr Atique Ahmed Behan	Department of Livestock Management, AHVS, SAU	Lecturer
Mr Aurangzeb Jahangir	Trade Development Authority of Pakistan	Assistant Manager
Mr Ayaz Ahmed	PSQCA	Assistant Director (in charge of agriculture and food division)
Mr Ghulm Mustafa Phul	Commissioner Office, Sukkur	Commissioner Sukkur
Mr Hussain Ali Kalwar	FrieslandCampina Engro Pakistan Ltd	Head of Government Relations and Corporate Affairs (South)
Mr Imran Bhatti	SFA	Director General
Mr Jahanzeb Ahmed	All Pakistan Livestock and Dairy Association	Legal Advisor
Mr Jameel Omar	Milk Retailers and Middleman Association	President
Mr Khizer Pervaiz	SEDF	Chief Executive Officer
Mr M Aslam Punian	FrieslandCampina Engro Pakistan Ltd	Zonal Milk Collection Manager
Mr Mahmood Nawaz Shah	Sindh Abadgar Board	Vice President
Mr Manzoor Baloch	Agriculture Department	Director General, Agriculture and Marketing

Mr Muhammad Harris Agar	Karachi CCI / Agar International	Vice President / Director
Mr Muhammad Qasim Badami	Doctor's Dairies and Feeds	Chief Operating Officer
Mr Mukesh Kumar	Small and Medium Enterprises Development Authority	Director
Mr Nadeem Monno	Dairyland Farm	Chief Executive Officer
Mr Naushir Merchant	DairyLac (Private) Limited	Chief Executive Officer
Mr Sadaqat Hussain	Small and Medium Enterprises Development Authority	Manager Associate
Mr Shakir Umar Gujjar	DCFA	President
Mr Syed Saud Ahmed Pasha	FrieslandCampina Engro Pakistan Ltd	
Mr Waqar Hussain Phulpoto	SEPA	Additional Director General, Director (Technical)
Ms Huma Rizwana	Livestock Management	Assistant Professor
Ms Noor Ahmed Baluch	Agriculture Research Institute	Director General

Annex 2: List of laws and regulations applicable to the dairy sector in Sindh

In addition to the legislation presented in the Regulatory Framework section of the Strategy, organizations operating in the dairy sector in Sindh must comply with the following laws and regulations. This list is non-exhaustive.

- Sindh Solid Waste Management Act, 2021
- Climate Change Policy 2022
- The Sindh Food Authority Act, 2016
- The Agricultural Produce Markets (Amendment) Act, 2019
- The Sindh Wholesale Agricultural Produce Markets (Development and Regulation) Act, 2010
- The Sindh Cattle (Contagious Diseases) Act, 1948
- Sindh Local Councils (Imposition, Assessment and Collection of Taxes) Rules, 1979
- Sindh Local Councils (Imposition, Assessment, Collection and Administration of Taxes, Rates, Toll and Fee) Rules, 2016
- Sindh Institute of Animal Health Act, 2014
- The Sindh Women Agricultural Workers Act, 2019
- The Sindh Land Revenue Act, 1967 and its 2011 and 2019 Amendments
- Cattle Trespass Act, 1871

Note: The Sindh Animal Feed Stuff and Compound Feed Act, 2022, is yet to be passed by the competent authority.

Annex 3: Trade and investment support institutions involved in the development of the dairy sector in Sindh

Name of institution	Role / responsibilities
Policy and regulatory support institutions	
Federal-level institutions	
MNFSR	MNFSR is responsible for developing policies and strategies related to the food security, agriculture, and livestock sectors in Pakistan. It is also responsible for regulating and coordinating the activities of various government departments, research organizations and private sector entities involved in these sectors.
AQD	AQD is responsible for inspecting all live animals, animal products and animal by-products that are imported into or exported from Pakistan; ensuring that these items meet the required health and safety standards; and issuing import and export permits accordingly. AQD operates quarantine facilities at key ports of entry and exit, conducts disease surveillance and monitoring programmes, and issues health certificates.
Other important institutions include: • **National Database and Registration Authority** • **National Animal and Plant Health Inspection Service**	
Provincial-level institutions	
Provincial Assembly of Sindh	The Provincial Assembly of Sindh plays a critical role in the development of the livestock sector in Sindh by formulating policies, allocating resources, providing oversight, advocating for stakeholders and raising awareness among the public about the importance of the sector.
Law and Parliamentary Affairs Department	The Department is primarily responsible for providing legal support and advice to GoS. It can play a vital role in creating and implementing legislation and regulations related to livestock, animal welfare, food safety and other related areas, ensuring that the legal framework for the livestock sector is comprehensive and effective.
Local government bodies (i.e. *Tehsil / Taluka* Municipal Administration / Town Municipal Administration), metropolitan corporations, and other zonal corporations)	Local governments have the authority to regulate and manage livestock markets, slaughterhouses and animal health services in their respective jurisdictional areas. The *Tehsil / Taluka* Municipal Administration also regulates the disposal of animal waste.
DoLF	DoLF plays a crucial role in promoting the development of the livestock and dairy sectors in Sindh. It works to improve animal health, livestock productivity and milk quality; and provides training and support services to farmers and other stakeholders in these sectors. It is instrumental in ensuring that national-level regulations and policies are enforced at the grassroots level.
DoASP	DoASP plays an important role in the livestock sector by developing policies and programmes, providing technical assistance and training, promoting market development, regulating prices and ensuring food security.
Transport and Mass Transit Department	This Department facilitates and regulates the transportation of livestock and livestock products within and outside the province.
DoIC	DoIC is responsible for promoting industrial development and facilitating commerce in the province. It plays an important role in promoting agro-based industries that use livestock products as raw materials.
SFA	SFA is responsible for ensuring that the food and beverages consumed by the public in Sindh are safe and meet the required standards, notably through inspections of food processing and manufacturing facilities. SFA will be following in the footsteps of the Punjab Food Authority in ensuring quality and safety measures in food production and supply.
Health Department	This Department plays a critical role in safeguarding public health in the province by ensuring the safety and quality of animal products, preventing the spread of animal diseases and promoting good animal husbandry practices.

Women Development Department	This Department is responsible for promoting gender equality and the empowerment of women in the province. It can promote women's participation in the sector, provide them with training and support, and advocate for policies that address their specific needs and priorities.
SEPA	SEPA regulates industries and activities that have the potential to cause environmental pollution in the province, monitors environmental quality, conducts environmental impact assessments and provides technical support for environmental policy formulation, among other activities. SEPA is responsible for executing the *Sindh Environmental Protection Act, 2014*.
Planning and Development Department	This Department is responsible for planning and coordinating development programmes and projects in Sindh. It formulates development plans, mobilizes resources, appraises and evaluates projects, formulates policies, and coordinates with other stakeholders to promote development in the province.
Finance Department	This Department is responsible for managing the financial resources of the province. It prepares and executes the provincial budget, manages government debt and financial records, collects revenue, engages in financial planning, manages the provincial treasury, and prepares financial reports.
Sindh Board of Revenue	The Board is responsible for the collection of revenue and taxes and the management of land and property records.
Sindh Bureau of Statistics	The Bureau is responsible for collecting, analysing, and disseminating statistical data related to the livestock sector (mainly collected from DoLF).
Sindh PPP Unit	The Unit is responsible for promoting and facilitating PPPs to improve service delivery and support economic growth in the province. This can include partnerships to develop and upgrade livestock facilities such as breeding farms, feed mills and slaughterhouses, among others.
SPPRA	SPPRA establishes rules, regulations and procedures for procurement, provides guidance to procuring agencies, evaluates bids and proposals, and monitors procurement practices to ensure compliance with procurement laws and regulations.
Other important institutions include: • **Irrigation Department** • **Energy Department** • **Environment, Climate Change and Coastal Development Department**	
Trade support institutions	
Federal-level institutions	
Trade Development Authority Pakistan	The Trade Development Authority of Pakistan works to identify potential markets, provides capacity-building support, shapes trade policy, organizes trade fairs and exhibitions, and promotes investment in the sector.
PSQCA	PSQCA is a federal government agency introducing, regulating and enforcing uniform quality standards across Pakistan. It has elaborated standards and specifications on dairy products through its National Standards Committee for Agriculture and Food Products – Technical Committee 3, 'Milk and Dairy Products'.
Federation of Pakistan CCIs	This is a non-profit organization that represents the interests of the business community in Pakistan. It advocates for policies and programmes that promote economic growth, conducts research and analysis, provides a platform for networking and business promotion, offers capacity-building support and promotes international trade.
Other important institutions include: • **National Logistics Cell** • **Federal Board of Revenue**	
Provincial-level institutions	
Karachi CCI, Hyderabad CCI, and other CCIs	These non-profit organizations represent businesses' interests in their respective areas and serve as a platform for businesses to interact with the government, exchange information and participate in policy discussions.
Business support institutions	
Federal-level institutions	

Small and Medium Enterprises Development Authority	This Authority is responsible for promoting and developing SMEs in Pakistan. It provides a range of business development services, advocates for policy reforms, promotes cluster development, helps SMEs upgrade their technology, and provides access to finance.
Pakistan Agricultural Research Council	The Pakistan Agricultural Research Council plays a critical role in researching various aspects of agriculture, including promoting breeding technologies, with the scope to breed superior-quality cattle.
DCFA	DCFA primarily represents dairy and cattle farmers in Pakistan. It advocates for the interests of its members, provides training and technical assistance, helps members to market their products, ensures compliance with quality standards and provides networking opportunities. DCFA has almost 3,000 members throughout the country (mostly not filed as taxpayers), about 50% from Sindh. The Association represents peri-urban dairy farmers only and it is the most significant influencer and voice of milk producers throughout Pakistan.
PDA	PDA is the representative body of the dairy industry in Pakistan. Its members include individual farmers, farmer organizations and companies involved in milk processing and dairy product manufacturing. It advocates for the interests of its members, provides training and technical assistance, helps members market their products, ensures compliance with quality standards and provides networking opportunities.
All Pakistan Livestock and Dairy Association	The Association is a representative body of livestock and dairy farmers, milk producers and processors in Pakistan, with 300 members registered in Pakistan, more than 60% of which are in Sindh. It aims to promote and develop the dairy and livestock sector in Pakistan by advocating for policies that support the industry, providing technical assistance and training to farmers and producers, and organizing events and conferences to raise awareness and share knowledge.
Other important institutions include: • **State Bank of Pakistan** • **Agricultural Development Bank of Pakistan** • **Zarai Taraqiati Bank Limited and other commercial banks**	
Provincial-level institutions	
Investment Department	This Department plays a critical role in promoting investment and creating an enabling environment for the overall economic development of the province.
Sindh Board of Investment	The Board is responsible for promoting and facilitating investment in Sindh. It provides information and guidance to investors, facilitates investment, develops infrastructure and advocates for policies that support growth.
Sindh *Abadgar* Board	This is the representative body of farmers in Sindh. Its primary role is to safeguard farmers' interests and promote agricultural development in the province, notably through advocacy and representation, capacity building, and marketing and price support.
Chamber of Agriculture	The Chamber advocates for policies and initiatives that promote the growth and sustainability of the livestock industry. It provides a platform for farmers, breeders, traders and other stakeholders in the sector to voice their concerns and seek solutions to the challenges they face.
SEDF	SEDF provides technical and financial assistance to promote opportunities in agriculture value chains, including dairy and livestock farming.
Other important institutions include: • **Information, Science and Technology Department**	
Academia and civil society networks	
AHVS, SAU	AHVS provides education and training, conducts research, provides outreach and extension services, collaborates with other institutions and stakeholders, and facilitates technology transfer to farmers.
SBBUVAS	SBBUVAS is a public sector university that provides education and training, conducts research, provides advisory services, collaborates with other institutions and stakeholders, and promotes entrepreneurship.
Shaheed Zulfikar Ali Bhutto Institute of Science and Technology	This is a fully chartered Institute approved and recognized by the Higher Education Commission, Pakistan, as a degree-awarding institution. It consists of campuses in Karachi, Islamabad, Larkana, Hyderabad and Dubai. It is conducting research on improving the soil fertility of almost 1,000 acres of arid land by using waste from farms through composting.

PCSIR	PCSIR conducts R&D activities in the livestock sector (including animal health, nutrition and breeding); provides technical support through the provision of technical advice, training and capacity building; and provides quality assurance services, including testing of animal feed and animal-based products.
SIAH	SIAH provides diagnostic, research and advisory services related to animal health and is responsible for conducting disease surveillance, and monitoring and controlling animal diseases to safeguard the health and welfare of animals. SIAH is also responsible for regulating the import and export of animals and animal products, and provides training programmes on animal health management for veterinarians, animal health workers and livestock farmers.
National Veterinary Laboratory, MNFSR	The Laboratory provides diagnosis of animal diseases; conducts disease surveillance to monitor the prevalence of animal diseases in Pakistan; conducts R&D activities to develop new diagnostic techniques, vaccines and treatment strategies for animal diseases; and provides capacity-building programmes for veterinarians and laboratory staff.
Other important institutions include: • **Food Sciences and Technology Department, University of Karachi** • **International Center for Chemical and Biological Sciences, University of Karachi**	

Annex 4: Initiatives supporting the development of the dairy sector in Sindh

International organizations have launched several initiatives to support the dairy industry and, to a larger extent, the livestock sector, in collaboration with DoLF. The Dairy Sector Development Strategy can leverage the achievements and experiences gained from these development programmes. Table A1 presents some of the significant recent and ongoing initiatives.

Table A1: Recent initiatives supporting the development of the livestock sector in Sindh

Name of project	Main features	Funding agency	Implementation period	Budget allocation
Sindh Agricultural Growth Project (Livestock Component)[10]	To improve the productivity and market access of small and medium producers. • Establishment of milk producer groups with access to chiller rooms, milk chillers, generators and milk analysers • Creation of milk shops • Rehabilitation of veterinary units • Provision of livestock management training for farmers and training of DoLF staff	World Bank	2017–2021 (closed)	100% from World Bank as a loan
Project on Sustainable Livestock Development for Rural Sindh – Research-based pilot project[11]	• Develop appropriate and easy-to-adopt technologies • Capacity-building of DoLF and livestock farmers • Calf salvation	• Japan International Cooperation Agency • GoS	2014–2021 (closed)	• 79% share of Japan International Cooperation Agency • 21% share of Government of Sindh
Transforming the Indus Basin with Climate Resilient Agriculture and Climate-smart Water Management[12]	• Strengthen the government's capacity to support farmers' communities to adapt to climate change • Build farmers' resilience to climate change through skills, knowledge and technology (about 200,000 rural households in eight districts of Punjab and Sindh) • Create a wider enabling environment for continuous adaptation and expanded sustainable uptake of climate-resilient approaches	Green Climate Fund signed this project with FAO and granted $35 million	Six-year period (currently in its final design stage)	Total cost: $47.69 million with co-financing from both provinces

In addition to the initiatives listed above, a number of interventions have been carried out by GoS to support the development of the Sindh dairy sector, including the following:

- **Provision of subsidies:** The government has provided subsidies to dairy farmers and processors for the purchase of feed, equipment and other inputs to improve the quality and quantity of milk production.
- **Capacity-building and training:** The government has provided training and capacity-building programmes for dairy farmers and processors to improve their knowledge and skills in areas such as animal health, feed management and milk processing.
- **R&D:** The government has supported R&D initiatives to improve the productivity and quality of the dairy sector in Sindh, such as the development of new dairy breeds, improved feed and nutrition programmes, and the use of modern milk processing technologies.

[10] More information is available from https://projects.worldbank.org/en/projects-operations/project-detail/P128307 and https://www.worldbank.org/en/news/video/2022/01/26/sindh-agriculture-growth-project-improving-milk-production-and-its-marketing-in-rural-sindh-pakistan

[11] More information is available from https://www.jica.go.jp/pakistan/english/activities/activity02_09.html and https://openjicareport.jica.go.jp/870/870/870_117_12044442.html

[12] More information is available from: https://www.fao.org/pakistan/news/detail-events/en/c/1126905/

- **Production of vaccines:** In order to make vaccines available to all dairy farmers at a reasonable cost, GoS is beginning domestic production of vaccines under a PPP model.

At the national level, with its redefined role under the Eighteenth Amendment to the Constitution of Pakistan, MNFSR undertook the following measures pertaining to the livestock sector:[13]

- Import of calf milk replacer and cattle-fed premix by the corporate dairy / meat subsectors at a concessional tariff
- Import of high-yielding dairy cattle breeds of Holstein Friesian and Jersey for enhanced milk production
- Provision of semen and embryos of high-yielding animals for the genetic improvement of indigenous low-producing animals
- Import of high-quality feedstuff / micro-ingredients for improving the nutritional quality of animal and poultry feed
- Import of dairy processing machinery / equipment at concessional tariffs / duty in order to encourage and promote the establishment of value addition in the country.

***Ehsaas Amdan* (Income) Programme:** Launched by the Prime Minister in 2020, this PKR 15 billion programme involves giving small 'assets' – most of it consisting of livestock such as goats, cows, buffaloes and poultry – to those who live below the poverty line in 375 rural union councils of the 23 poorest districts across the four provinces of Pakistan. In Sindh, the programme districts include Badin, Thatta, Sujawal, Kashmore, Shikarpur, Tharparkar and Umerkot. The four-year programme has set a target of providing around 200,000 assets to deserving households (60% women and 30% youth beneficiaries). In total, it will benefit a population of 1.4 million people across the country.

Support development and piloting of the Pakistan Animal Identification and Traceability System: This project is under execution with the technical and financial support of FAO in Pakistan. Pakistan currently does not have a reliable animal identification and traceability system to manage livestock identification and movement in the country. The lack of such a system poses significant challenges for Pakistan, specifically in the export of livestock and their products, in the wake of limited resources and the capacity of animal health services to deliver effective animal health programmes. The project will be used as pilot demonstrations in cattle and buffaloes in limited geographic regions, smallholder livestock farming and selected feedlot-fattening dairy farms.

Enhancement of FMD control programme in Pakistan: This project is under execution in collaboration with the Government of Pakistan, Japan International Cooperation Agency and FAO in Pakistan with the following objectives:

- Reporting of FMD outbreaks by stakeholders (veterinarians, veterinary assistants and dairy farmers)
- Raising the awareness of dairy farmers
- Rapid response to FMD outbreaks.

[13] The information contained in this section was sourced from Government of Pakistan, Finance Division (2022).

References

de Jong, M. (2013). *Dairy value chain assessment final report for the agribusiness project.* United States Agency for International Development Agribusiness Project. http://agribusiness.org.pk/wp-content/uploads/2015/04/1.-Dairy-Value-Chain-Assessment-Feb-242013.pdf

Euromonitor International. (2021). *Passport – Packaged food in Pakistan*.

Food and Agriculture Organization of the United Nations. (2016). *Final evaluation of the project development of a framework for the progressive control of foot and mouth disease in Pakistan.* https://www.fao.org/3/bq883e/bq883e.pdf

Food and Agriculture Organization of the United Nations. (2018). *Transforming the Indus Basin with climate resilient agriculture and climate-smart water management.* https://www.fao.org/pakistan/news/detail-events/en/c/1126905/

Food and Agriculture Organization of the United Nations, World Organization for Animal Health, & European Commission for the Control of Foot-and-Mouth Disease. (2018). *The progressive control pathway for FMD control (PCP-FMD): Principles, stage descriptions and standards.* https://www.fao.org/3/CA1331EN/ca1331en.pdf

Gazette of Pakistan. (2017). *Companies Act, 2017*. https://www.secp.gov.pk/document/companies-act-2017/?wpdmdl=28472

Government of Pakistan. (2022). *Pakistan export strategy, meat 2023–2027.* https://tdap.gov.pk/wp-content/uploads/2022/09/Meat-Export-Strategy-3_web-1.pdf

Government of Pakistan, Finance Division. (2021). *Pakistan Economic Survey 2020–21.* https://www.finance.gov.pk/survey/chapters_21/PES_2020_21.pdf

Government of Pakistan, Finance Division. (2022). *Pakistan Economic Survey 2021–22.* https://www.finance.gov.pk/survey/chapter_22/Economic%20Survey%202021-22.pdf

Government of Sindh, Agriculture, Supply and Prices Department; Livestock and Fisheries Department; & Planning and Development Department. (2018). *Sindh agriculture policy (2018–2030).* https://faolex.fao.org/docs/pdf/pak191432.pdf

Habib, Z. (2021). *Water availability, use and challenges in Pakistan – Water sector challenges in the Indus Basin and impact of climate change.* FAO. https://www.fao.org/documents/card/en/c/cb0718en

International Trade Centre. (2015). *Traceability in food and agricultural products* (Bulletin No. 91/2015). https://www.intracen.org/uploadedFiles/intracenorg/Content/Exporters/Exporting_Better/Quality_Management/Redesign/EQM%20Bulletin%2091-2015_Traceability_FINAL%2014Oct15_web.pdf

International Trade Centre. (2020). *Invisible barriers to trade – Pakistan: Business perspectives.* https://intracen.org/file/ntmpakistanfinalwithcoverspdf

International Trade Centre. (2023). *Export potential map*. https://exportpotential.intracen.org

International Trade Centre. (2023). *Trade map*. http://www.trademap.org

Japan International Cooperation Agency. (n.d.). *Activities in Pakistan. Project for the master plan study on livestock and dairy development in Sindh Province.* https://www.jica.go.jp/pakistan/english/activities/activity02_09.html

Japan International Cooperation Agency. (2011). *The project for the master plan study on livestock, meat and dairy development in Sindh Province in the Islamic Republic of Pakistan: Final report. Part 1: Master plan.* https://openjicareport.jica.go.jp/pdf/12044434_01.pdf

Japan International Cooperation Agency. (2011). *The project for the master plan study on livestock, meat and dairy development in Sindh Province in the Islamic Republic of Pakistan: Final report. Part 2: Present situations.* https://openjicareport.jica.go.jp/870/870/870_117_12044442.html

Pakistan Bureau of Statistics. (2006). *All Pakistan livestock census 2006*. https://www.pbs.gov.pk/publication/pakistan-livestock-census-2006

Pakistan Business Council. (2021). *Scaling-up bovine meat exports of Pakistan – A review of opportunities in the bovine meat sector.* https://www.pbc.org.pk/research/scaling-up-bovine-meat-exports-of-pakistan-a-review-of-opportunities-in-the-bovine-meat-sector/

Pakistan Business Council. (2022). *Modernizing the dairy sector: Making safe milk and its value-added products ubiquitously available in Pakistan*. https://www.pbc.org.pk/research/modernizing-the-dairy-sector/

Pakistan Ministry of National Food Security and Research. (2018). *National food security policy, 2018–2030*.

Precedence Research. (2021). *Dairy products market (by product type: milk, cheese, butter, desserts, yogurt, and others; by distribution channel: supermarket / hypermarket, specialty stores, convenience stores, and others) – Global industry analysis, size, share, growth, trends, regional outlook, and forecast 2022–2030.* https://www.precedenceresearch.com/dairy-products-market#:~:text=According%20to%20Precedence%20Research%2C%20the%20global%20dairy%20products%20market%20was,US%24%20640.8%20billion%20by%202030

Rizwana, H., Khaskheli, M., Isani, G.B., & Baloch, G.M. (2017). Management of different dairy production systems in Sindh. *Journal of Basic & Applied Sciences, 13,* 472–480. https://pdfs.semanticscholar.org/a2f7/52afed5ba79f82a6ac911eccad6ac0de60eb.pdf

Warriach, H.M., Mubarik, A., & Aqsa, Y. (2020). Beef cluster feasibility and transformation study. In A. Mubarik (Ed.), *Cluster development based agriculture transformation plan vision-2025*. Project No. 131(434)PC/AGR/CDBAT120/2018. Planning Commission of Pakistan, Islamabad, & Centre for Agriculture and Biosciences International. https://www.scribd.com/document/550543836/Beef-Cluster-Report#

World Bank. (2020). *Modernizing trade in Pakistan: A policy roadmap.* https://documents1.worldbank.org/curated/en/855261578376618421/pdf/Modernizing-Trade-in-Pakistan-A-Policy-Roadmap.pdf

World Bank. (2022). *Sindh agriculture growth project: Improving milk production and its marketing in rural Sindh, Pakistan.* https://www.worldbank.org/en/news/video/2022/01/26/sindh-agriculture-growth-project-improving-milk-production-and-its-marketing-in-rural-sindh-pakistan

World Bank. (2023). *PK: Sindh agricultural growth project.* https://projects.worldbank.org/en/projects-operations/project-detail/P128307

Zia, U.E. (2007). *Pakistan: A dairy sector at a crossroads.* FAO. https://www.fao.org/3/i0588e/I0588E07.htm