## Sustainable Dairy Production in Pakistan: Lesson Learned and Way Forward

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#### Abstract

Dairy sector in Pakistan plays a pivotal role in the national economy and its value is more than the combined value of major cash-crops i.e. wheat and cotton. Annual milk production during 2021/2022 was estimated approximately 65.7 million tonnes, giving Pakistan a place in the list of world's top 5 milk producing countries. Dairy farming in Pakistan is fragmented and practiced on various scales both in rural and peri-urban areas mainly by private sector. However, this industry is facing challenges (nutrition, healthcare, breeding, government support and public health) that threaten its sustainability and livelihoods of millions of people involved in the sector.

Keywords: Dairy policy, Hygiene, Public health, Pakistan, Productivity, Sustainability

### Overview

Pakistan's dairy industry is a vital component of agriculture sector, contributing significantly to its economy and providing livelihoods for millions of people and is an important source of income especially for small-scale farmers and rural communities, accounting for over 12% of the country's agricultural GDP (GOP, 2021). The total value of milk produced is more than the combined value of wheat and cotton crops (FAO, 2011). Of the total milk produced in the country, 95% is produced by the rural and peri-urban small-scale farmers keeping two to three dairy animals (Tahir et al., 2019). Dairying in Pakistan is practiced on various scales both in rural and peri-urban areas mainly by private sector (FAO, 2011). However, if generally characterized dairving is a subsistence and fragmented sector of economy. Except a few of the urban and peri-urban commercial dairy units, most of the dairy animals in Pakistan are kept in rural setting in integration with croplivestock systems. This fragmentation limits the sector's ability to take advantage of economies of scale and limits its ability to compete with larger producers in the global market.

#### 1. Dairy Production systems in Pakistan

Dairy production systems in Pakistan are classified into two categories: traditional and modern. There are over 12,000 estimated commercial dairy farms in Pakistan and overall about 75% are small-scale enterprises (Tahir et al., 2019). These own a few cows/buffaloes and sell milk to local collectors and use low-input lowoutput, methods which often result in low yields and poor quality milk (Tahir et al., 2019 and Riaz, 2008). Modern dairy production systems involve large-scale commercial farms (Tariq et al., 2008) that use high-vielding breeds of cows/buffaloes. alongwith feed concentrate, employ trained professionals and use state-of-the-art equipment to ensure high yields of hygienic milk (Sattar, 2020). The government, NGOs, and private sector organizations need dedicated efforts and should work together to promote modern dairy farming practices that will ultimately increase milk productivity and commercialization. This will contribute to the overall development of the dairy sector in Pakistan.

## 2. Current feeding practices and related issues

The biggest challenge faced by Pakistan dairy sector is limited access to quality feed resources (Tariq, 2020 and Tahir et al., 2019). Major feed resources for dairy industry in Pakistan include: Fodder: Pakistan's important fodder crops include alfalfa, sorghum, maize, and oats. Commercial concentrates: Pakistan imports a significant amount of concentrates, including soybean, corn gluten and rice bran. However, local alternatives, such as cottonseed and canola meal, are also available (Tarig et al., 2021; Tarig, 2020; Sattar, 2020). By-products: Various food industry by-products, such as wheat-bran, ricepolish, and molasses, are used cost effectively as feed resources (Tariq et al., 2021). Grazing: Dairy animals are allowed to graze the fields in many areas of Pakistan. Fodder scarcity in Pakistan occurs during the severe winter (Dec-January) and severe summer (May-to-July) months (Tariq et al., 2021). Pakistan government, alongwith NGOs, is working to improve the feed quality and availability through silage and haymaking and training of farmers to manage their animals' feeding requirements. The potential policy interventions to improve dairy production could be provision of balanced rations, hay and silage making. hvdroponic fodder. mineral supplementation and pasture management.

## 3. Present dairy breeding strategies

Dairy breeding practices for high milk production in Pakistan typically involves the use of highvielding exotic dairy breeds e.g. Holstein-Friesian, Jersey, and crossbreds (Hassan and Khan, 2013). To further enhance yields, farmers may also use AI to breed their cows (Kakar et al., 2012). One major concern is the lack of genetic diversity among the national dairy genetic resources (Tahir et al., 2019). Many small-scale farmers cannot afford to purchase expensive animals, which limits their ability to increase milk production (Feyissa et al., 2023). In order to improve the genetics of local cattle breeds and increase milk production, the government of Pakistan should implement various policy interventions in dairy breeding. These interventions include the provision of AI services, breeding programs, capacity building, financial support, and the development of breeding policies.

# 4. Housing practices for dairy animals in Pakistan

Housing practices for dairy animals can vary depending on the type of dairy operation, location, and resources allocation in Pakistan. Generally, small-scale farmers may keep their animals in traditional open-air shelters or small sheds made of mud and bricks that may not provide much protection (Tariq, 2013). In contrast, commercial dairy farms may use more modern housing systems (Tariq, 2022 and Tariq, 2013). Dairy animal housing interventions can play an important role in dairy development in Pakistan. By considering climate, feed and water, space, hygiene, and cost-effectiveness, housing interventions can help to improve animal health and welfare, increase milk production and and support sustainable farming quality. practices.

# 5. Issues of dairy animal healthcare and welfare

Dairy animal healthcare and welfare is a critical issue in Pakistan (Ghafar et al., 2020) with lack of access to veterinary healthcare. The number of veterinary clinics could be increased in rural areas (Afzal, 2009) and government could also provide subsidies for veterinary healthcare. On the other hand poor-nutrition and poor-housing also contribute to poor-health and welfare (Gaworski and Boćkowski, 2022 and Tarig, abuse 2020). Animal cruelty and are unfortunately common in Pakistan (Hussain et al., 2020) that could be addressed by passing enforcement laws by the government. Education campaigns can also be launched to raise awareness about animal welfare and treating animals with respect and compassion. By implementing the following policy interventions including disease control and prevention programs, improved biosecurity, effective veterinary services, training and education of dairy farmers on disease prevention and cure and by promotion of good animal welfare practices, the health and productivity of dairy animals can be improved ultimately leading to a more sustainable and profitable dairy industry in Pakistan.

### 6. Public health concerns and dairy sector

The dairy industry in Pakistan also poses some public health concerns related to the quality and safety of dairy products (Tariq, 2022). Farmers often use antibiotics, but the residues pose a health risk (Rehman et al., 2020) and can lead to antibiotic resistance (Al-Shaalan et al., 2022). Another concern is milk adulteration with e.g. water, starch, and urea that pose health risks (Barham et al., 2014). Additionally, unhygienic dairy practices can lead to the contamination of milk with E. coli, Salmonella, and Listeria (Tariq, 2022). The Pakistan Standards and Quality Control Authority (PSQCA) has set maximum antibiotics residue limits in milk and established guidelines for milk production and processing. However. implementation the of these regulations is still a challenge, particularly in the informal sector. In general, a holistic policy approach is needed that takes into account the interventions: following strengthening of regulations to ensure milk and dairy products quality, improving testing facilities, providing incentives for good hygiene practices and promoting public awareness to improve public health concerns related to the dairy sector in Pakistan.

## 7. Dairy marketing system in Pakistan

In Pakistan milk production and marketing is controlled mainly by the unorganized private sector, comprising of dairy farmers, middlemen, milk processing-units and consumers (Tariq et al., 2008). Less than 5% of milk produced is marketed through proper channels, remaining more than 95% is marketed without chilling and pasteurization by local milk marketing system (Zia, 2007). Prime factors affecting milk marketing system include: absence of organized

marketing-chain, unorganized farmers, seasonal fluctuations. low investment, middleman role, lack of infrastructure, price fixation, and legislative measures. Two of the favored options being mulled are i) piloting idea of corporate farming and ii) providing additional support services to small, medium and large farmers (Tariq et al., 2008). In order to exploit full potential of dairy sector in Pakistan, strong action must be taken to strengthen the regulatory framework governing dairv marketing. improving market linkages, support for dairy farmers from the government, encourage private sector investment, developing value-added products, limit the role of middlemen, and promote commercialization in the dairy sector.

# 8. Pakistan dairy industry and environmental sustainability

Like any other industry, the dairy sector also has environmental sustainability concerns and one of the primary concerns associated with the dairy industry in Pakistan is the issue of waste disposal (Iqbal et al., 2022 and Tariq, 2022) that can lead to soil and water pollution. Inadequate waste management can be potential source of greenhouse gases, which contribute to climate change. Moreover, the discharge of untreated effluent from dairy farms into rivers and streams can cause water pollution (Iqbal et al., 2022). In general, a combination of regulatory and voluntary approaches that include promotion of sustainable dairv farming practices. regulation of dairy strengthening waste management, development of eco-friendly dairy products, promoting the use of organic farming and public awareness will be required to improve environmental sustainability in the dairy sector in Pakistan.

# 9. Pakistan dairy sector: Labor force and livelihood options

The dairy sector is the second-largest agricultural sub-sector in Pakistan, accounting for about 13% of the country's total agriculture output (GOP, 2021) and is an essential source of income for rural households (Asghar et al., 2021). These small-scale farmers face several challenges, including low productivity, inadequate credit, inadequate veterinary services, and limited market access. To address these challenges, the government and NGOs are implementing various initiatives to support small-scale farmers (Zia, 2007). Moreover, initiatives like "Women's Livelihood through Dairy Development" have been launched in collaboration with NGOs to empower women (Yasmin and Yukio, 2015 and Lombardini and Bowman, 2015). Such initiatives focus on providing training on dairy farming, animal health, and milk processing to women in rural areas. In order to improve livelihood options in the dairy sector in Pakistan requires a effort from multi-stakeholders concerted including government, private sector, and farmers themselves. Addressing the challenges faced by the sector through the suggestions commercialization, including enhancing productivity. enhancing product quality, promoting dairy cooperatives, developing values added products and government support can help to create a more sustainable and profitable dairy industry, benefiting millions of people across the country.

### Conclusions

In conclusion, recommendations for sciencebased public policy should be devised and put into practice to encourage the dairy sector's sustainable expansion in Pakistan. The lack of access to credit, low investment, subsistence farming, low genetic potential of dairy animals, lack of dairy development initiatives, lack of government support, technical expertise, and market linkages hinders the growth of modern dairy farming in Pakistan.

## Suggestions and Way Forward

Keeping in view the above situation analysis of important sector of economy. this the government should launch a comprehensive Livestock and Dairy Development program to improve the productivity, efficiency and sustainability of the dairy sector. The focused areas should include better veterinary services provision, improving feeding, breeding, and enhancing milk collection and processing infrastructure. The fundamental issue of food safety must be addressed in the existing milk marketing system in Pakistan. Most of the milk (95%) is sold directly to households, not chilled and is un-pasteurized. Food safety regulations regarding dairy sector are major areas of government policy intervention. There is need for improving the efficiency of the small-scale dairy production units through involvement of participatory research. The poor distribution infrastructure should be replaced by cold chain. Special emphasis should be given on: the development of organized marketing system, commercial market outlets, depth analysis of production systems and improved nutritional management (group feeding) of the dairy buffalo/cow in a whole farm system context resource use efficiency leading to and sustainability. The price should be fixed realistically keeping in view the cost of milk production and a decent market margin. The on farm milk processing and marketing has recently received significant consideration by farm families throughout the world. Thorough analysis of the socioeconomic and biophysical features, opportunities for establishing community cooperatives is a potential option for future dairy development in Pakistan.

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