



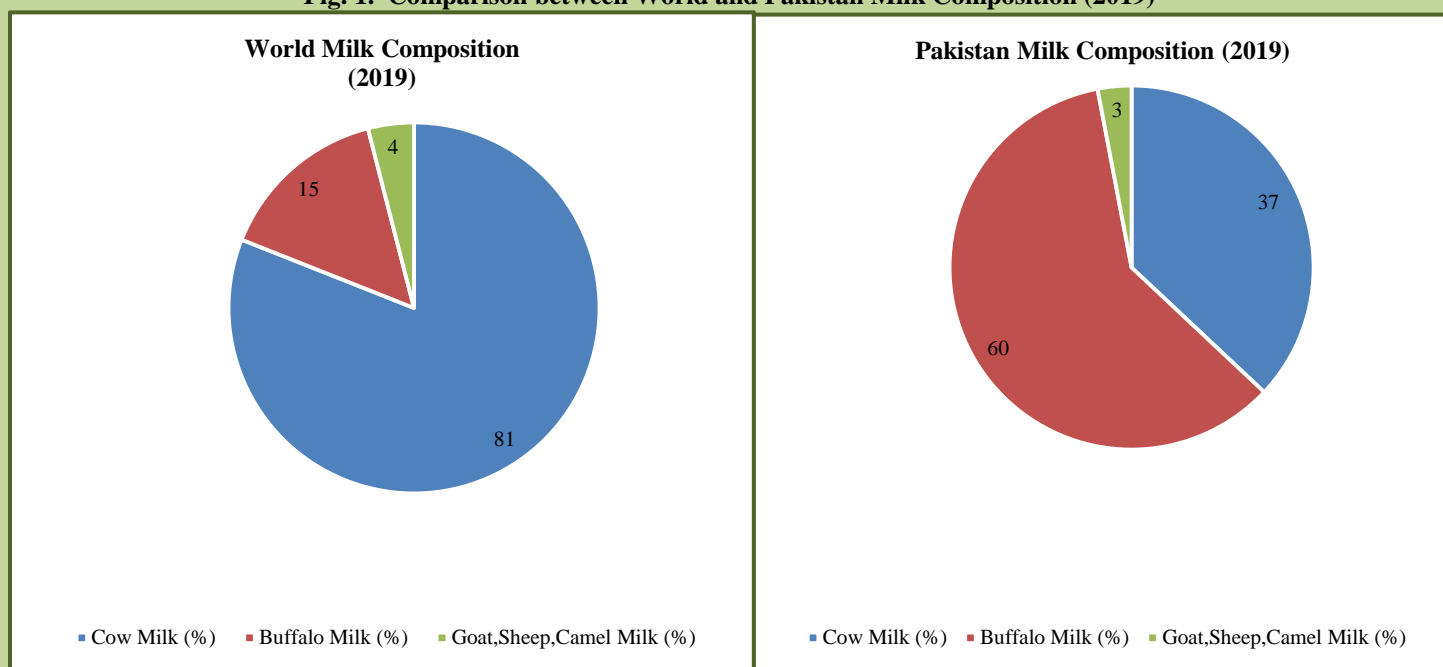
What is Holding Back Milk Production Potential in Pakistan?¹

ABDUS SATTAR, *Pakistan Institute of Development Economics, Islamabad.*

WORLD MILK PRODUCTION

In 2019, global milk production was 852 million tonnes, of which the share of cow and buffalo milk was 81 percent and 15 percent, respectively, while the combined share of goat, sheep, and camel milk was 4 percent (FAO, 2020). Pakistan was the third-largest milk producer in 2019, producing 57 million tonnes. In this figure, the share of buffalo and cow milk was 60 percent and 37 percent, respectively, while the combined share of goat, sheep, and camel milk was 3 percent in total, as shown in Figure 1.

Fig. 1. Comparison between World and Pakistan Milk Composition (2019)



Source: FAO, Country Stat.

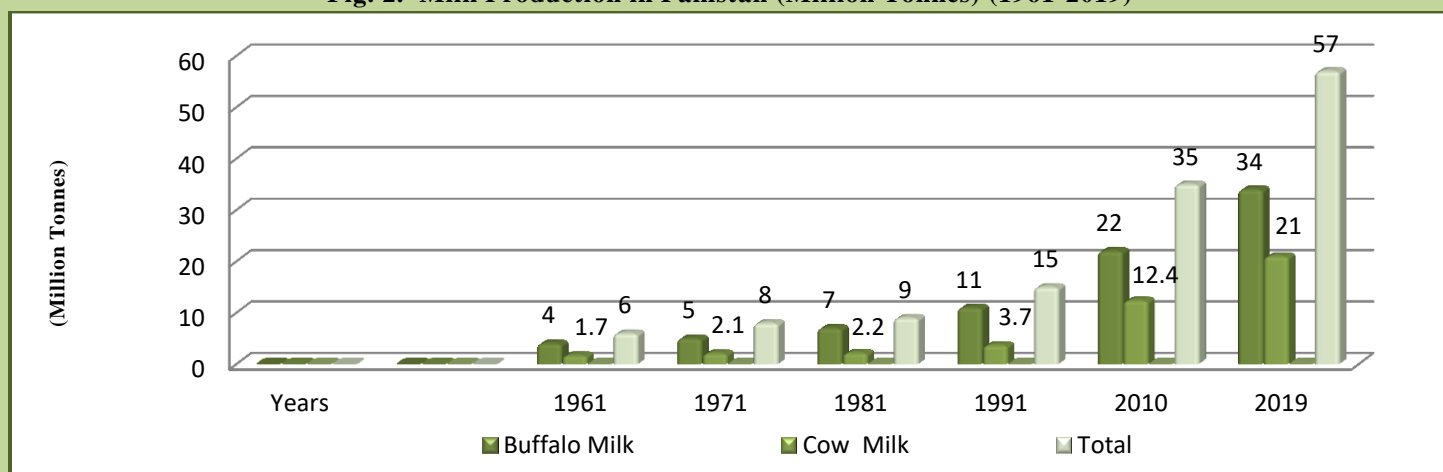
In Pakistan, livestock is the backbone of the agricultural sector and a significant source of daily income for landless rural households and small farmers. Its importance in the rural economy is underlined by the fact that 35-40 percent of the income of 8 million rural families is dependent on livestock (Economic Survey of Pakistan, 2018-19).

Milk production has become the single leading commodity among it. Its gross product value was Rs.2.36 trillion, 54.4 percent of the total gross value of livestock and poultry products of Rs.4.34 trillion (MNFS&R 2017-18). Most recently, identifying five major milk clusters at the country level shows the government's commitment to milk production in Pakistan (Milk Cluster Report, 2020).

Milk production has increased nine times with an average growth rate of more than 3 percent during the last six decades, with buffalo and cow milk the major drivers in total milk production (Figure 2). Total annual milk production jumped from 6 million tonnes in 1961 to 57 million tonnes in 2019; it low until 1991(15 million tonnes) before an uptick to the figure in 2019. It multiplied three and half times between 1991 and 2019.

¹ The policy brief is based on author's working paper submitted as PIDE working paper series entitled "What is holding back milk production potential in Pakistan?"

Fig. 2. Milk Production in Pakistan (Million Tonnes) (1961-2019)



Source: FAO, Country Stat.

MILKING ANIMALS AND MILK YIELD

Milking animals and milk yield play an essential role in enhancing milk production. The total number of milking buffaloes increased from 2.6 million to 14.9 million, and milk yield increased from 1.6 tonnes to 2.3 tonnes, while milk production increased from 4 million tonnes to 34 million tonnes during 1961-2019. The number of milking cows grew from 1.9 million to 14.1 million, and milk yield from 0.9 tonnes to 1.5 tonnes, while milk production grew from 1.7 million tonnes to 21 million tonnes in Pakistan during 1961-2019 (Table1).

Table 1

Number of Milking Animals, Milk Yield (1961-2019)

Years	Milking Buffalo	Buffalo	Milking Cow	Cow		
	Buffaloes (Millions)	Milk Yield (Tonnes)	Milk Production (Million Tonnes)	Cows (Millions)	Milk Yield (Tonnes)	Milk Production (Million Tonnes)
1961	2.6	1.6	4	1.9	0.9	1.7
2018	14.5	1.9	28	13.6	1.2	16.3
2019	14.9	2.2977	34	14.1	1.4606	21

Source: Calculations based on FAO, Country Stat.

The population of milking buffaloes and their milk yield increased 6 and 1.4 times, respectively, while that of milking cows grew to seven and 1.6 times, respectively. Table 1 also shows that the population of milking cows and their yield growth augmented slightly higher than milking buffaloes' population and yield growth during 1961-2019. Therefore, milk production is dominated by milking animals, not their milk yield.

The milk composition also underwent a change during 1961-2019. The buffalo and cow milk composition constituted 70 percent and 28 percent, respectively, while goat, sheep, and camel milk share was 1 percent in 1961. By 2019, buffalo and cow milk composition was 60 percent and 37 percent, respectively, while goat, sheep, and camel milk share stood at 3 percent.

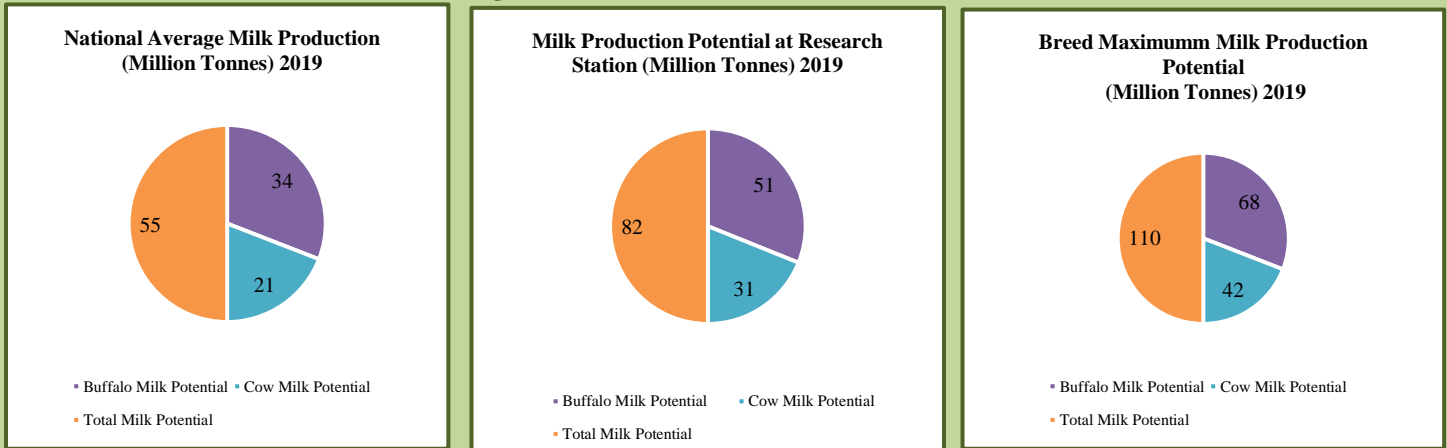
The share of buffalo milk decreased by 10 percent, while the share of cow milk increased by 9 percent in total milk production during the preceding six decades. However, the combined share of goat, sheep, and camel milk tripled during the same period in Pakistan.

Subsequently, buffalo milk still dominates total milk production in Pakistan. But the share of cow milk is rapidly increasing. A study Burki and Khan (2019) outlines that pure buffalo's dairy farms are dwindling while mix (buffaloes and cows) and pure cow dairy farms are becoming the norm. This is due to buffalo-only dairy farms becoming unprofitable due to the cost of feed and fodder and the stationary farm gate milk price.

MILK PRODUCTION POTENTIAL IN PAKISTAN

The national average buffalo milk production in 2019-2020 was 34 million tonnes, while the estimated milk potential is 51 million tonnes at the research station, and the estimated breed maximum potential is 68 million tonnes (Figure3).

Fig. 3. Milk Production Potential in Pakistan



Source: Calculations are based on Bhutto et al. (1993).

The national average for cow milk production was 21 million tonnes, while its estimated milk potential was 31 million tonnes at the research station. The estimated breed maximum potential was 42 million tonnes in 2019-2020. The total national average milk production of buffalo and cow was 55 million tonnes. Their estimated milk potential and maximum breed potential at the research station were 82 million and 110 million tonnes in 2019-2020, respectively.

According to Figure 3, Pakistan can produce between 82 to 110 million tonnes of buffalo and cow milk with the existing stock of milking animals, though currently, it produces only 55 million tonnes.

As outlined earlier in Table 1, milking cows' population and yield grew slightly higher than milking buffaloes' population and yield growth. It is worth noting that the potential for cow milk production is higher than that for buffalo milk production.

WHAT IS HOLDING BACK MILK PRODUCTION POTENTIAL?

The Friesian cow and Sahiwal cow produced 2000 liters of milk/lactation in 1910. The Friesian cow milk production has increased to over 9000 liters/lactation while Sahiwal cow milk production has remained at 2000 liters/lactation (Khan, n.d). The major difference between both is only Research and Development (R&D). The primary milk-producing countries with advanced R&D, with a lesser number of milking animals with high milk yield, are leading in milk production.

Globally, R&D is done by the private sector in the world. In the USA, entire R&D is conducted by big corporations, with China and India following the same pattern. Israel and South Korea lead the world with 5 percent of GDP research and development expenditures. In several advanced economies, R&D spending is 3 percent of GDP, with the USA, China, and Japan spending 2.5 percent of their GDP on R&D. Even in India, R&D spending is between 0.62 percent to 0.86 percent of GDP. In a study conducted in Hmachel Pradesh, Ratna and Sharma (2017) used time-series data (1994-2011). They found that a one percent increment in the number of crossbred cows and artificial insemination would increase total milk production by 0.64 and 0.90 percent, respectively.

In contrast, the overall economic surplus from milk production was estimated to be Rs 222 crores from Rs 158 crores of R&D investments, with a benefit-cost ratio of 1.41, giving a 62 percent internal rate of return.

Overall, R&D expenditure in Pakistan has been exceptionally low compared to the rest of the world. It ranked 97 out of 141 countries in this regard. According to UNESCO, Pakistan's overall R&D expenditure was 0.24 percent of GDP in 2017. The highest amount was 0.63 percent of GDP in 2007, while its lowest value was 0.11 percent in 1998.

The share of GDP for the dairy sector always remained negligible. The budgetary allocations to the livestock sector have never exceeded more than 0.5 percent of total development spending, which is not enough for purchasing the necessary drugs (Afzal, n.d).

Unfortunately, R&D has been ignored in Pakistan for seven decades. So, like other sectors of the economy, the dairy sector also suffered. The sector still relies on traditional methods and not up to date with modern milk-producing techniques. The opportunities for the latest R&D in livestock research laboratories locally produced high milking yield animals through genetic technology, latest vaccines, animal feed, and health issues remain minimal. Without robust R&D, high milking yield animal breeds and milk yields cannot be introduced through genetic advancement. Increasing milking animals needs sufficient green fodder. But existing fodder stock does not fulfil the basic nutritional needs of livestock, and has created a permanent fodder shortage and put pressure on input prices.

Their nutritional requirements fulfilled by unhygienic feed and water aggravate chronic diseases and lead to low milking productivity. The lack of R&D opportunities is the paramount predicament facing the dairy sector. Low productivity of milking animals, fodder shortage, high input prices, chronic animal diseases, absence of formal milk marketing system, less reward and non-availability of credit support to small dairy farmers, etc., are its by-products (Sattar,2020).

POLICY RECOMMENDATIONS

- The dairy sector should be separated from agriculture, and policymakers should allocate a separate budget to the dairy sector. The major chunk should be allocated to R&D, proportionate to the value of each agro product.
- Prevent exploitation of milk producers by an appropriate milk pricing policy.
- Dairy farmers should start switching to cow milk rather than focusing only on buffalo milk production.
- A credit policy needs to be formulated so that soft-term loans reach the gross root producers. Furthermore, insurance companies should start programs for the valuable milking animals through policies tailored for the sector.
- The private sector should establish more milk collection centres and cold chains in rural areas. Progressive dairy farmers should be encouraged to import bulls and best milking cow breeds from the USA, Europe, New Zealand, and Australia.
- Milk processing companies should focus on dairy items like casein, butter, cheese, skimmed milk powder, whole milk powder, and whey powder.
- Raising milk yields through genetic innovations and cross-breeding cows with better breeds. Such steps could increase milk yields three to four times from the present figures.

REFERENCES

- Afzal, M. (nd) Strategy for Livestock Development in Pakistan. Animal Sciences Division, Pakistan Agricultural Research Council, Islamabad.
- Bhutto, M. A. et al. (1993) Livestock Breeds of Pakistan. Islamabad: Ministry of Food, Agriculture, and Cooperatives (Livestock Division), Government of Pakistan.
- Burki, Abid A. and Khan, Mustaq A. (2019) Economic Impact of Pakistan's Dairy Sector Lessons for Building Sustainable Value, University of Management Sciences (LUMS) Lahore, Pakistan
- Economic Survey of Pakistan (various Issues). Ministry of Finance, Government of Pakistan
- FAO <http://www.fao.org/dairy-production-products/production/en/>
- FAO (2020) Dairy and dairy products OECD-FAO agricultural outlook 2020-2029
- Khan, M.S. (n.d) UAF sub- Centre for National Livestock, Breeding, Genetics, and Genomics, University of Agriculture Faisal Abad, Pakistan.
- Milk Cluster Report (2020) Cluster Development Based Agriculture Transformation Plan Vision-2025, Milk Cluster Feasibility and Transformation Study. Edited by Dr. Mubarik Ali Planning Commission of Pakistan, Ministry of Planning, Development & Special Initiatives https://www.pc.gov.pk/uploads/report/Milk_Cluster_Report.pdf
- MNFS&R (Ministry of National Food Security and Research). 2017-18. Pakistan Economic Survey. Islamabad, Finance Division, Economic Adviser's Wing
- Ratna, Jayant, and Sharma, K D. (2017) Impact of investment in research and development on growth and performance of dairy sector in Himachal Pradesh. Indian J Dairy Sci 70(4):471-476 (2017).
- Sattar, A. (2020) Milk production in Pakistan. Blog published on PIDE website March 01, 2020. Pakistan Institute of Development of Economics, Islamabad, Pakistan. <https://pide.org.pk/blog/milk-production-in-pakistan/>
- Sattar, A. (2020) What is holding back milk production in Pakistan. Blog published on PIDE website June 18, 2020. Pakistan Institute of Development of Economics, Islamabad, Pakistan. <https://pide.org.pk/blog/what-is-holding-back-milk-production-in-pakistan/>
- UNESCO Institute for Statistics (<http://uis.unesco.org/>)

Pakistan Institute of Development Economics

Quaid-i-Azam University Campus, Islamabad

Ph: +92-51-9248137

Email: publications@pide.org.pk

Web: www.pide.org.pk