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Comparative economics of milk production of local cow (Kokan Kapila), crossbreed cow and buffalo in Ratnagiri district of Maharashtra

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Abstract

The study, conducted in Ratnagiri district of Maharashtra, was based on primary data collected from 90 dairy farmers across six tahsils. Farmers were categorized into small (1-4 animals), medium (5-6 animals), and large (above 7 animals) groups based on herd size. Utilizing standard cost concepts, the study aimed to calculate cost return and profitability in milk production. The findings indicated that buffalo incurred the highest per-animal maintenance cost at ₹ 61,450, followed by crossbreed cow at ₹ 57,567, and local cow (Kokan Kapila) at ₹ 39,826. Similarly, net return per animal was highest in buffalo at ₹ 60,226, followed by crossbreed cow at ₹ 52,543, and local cow (Kokan Kapila) at ₹ -908. The benefit-cost ratio was 0.97, 1.91, and 1.98 for local cow (Kokan Kapila), crossbreed cow, and buffalo, respectively. Additionally, the per-liter cost of milk production was observed to be ₹ 26.07 in crossbreed cow, ₹ 26.15 in buffalo, and ₹ 55.57 in local cow (Kokan Kapila). Consequently, the study concluded that buffalo milk production was the most profitable in Ratnagiri district.

Keywords: Maintenance cost, benefit cost ratio, net return, profitability, cost, milk production

1. Introduction

Milk production in India is predominantly carried out by smallholders within a mixed farming system. Despite significant progress in Indian dairying, animal productivity has remained low. Average dairying holds great importance in providing employment to rural communities and serves as a stable source of income to enhance their earnings from the main enterprise they pursue, namely crop husbandry. Dairy enterprises play a vital role in the rural economy of India, providing income and employment not only to the labor force but also to the farming community at large. Maximizing returns from small holdings can be achieved through the proper integration of dairy enterprises with crop production. In the dairy enterprise, the role of feed is particularly crucial in the dairy sector.

The dairy sector has significantly contributed to the advancement of the rural economy in India. The government has played a crucial role in fostering dairy farming infrastructure through initiatives like the National Dairy Plan, which focuses on sustainable development within the sector. Additionally, broader empowerment programs, such as the Jan Dhan Yojana and the Start-up India initiative, have further supported the dairy industry. Over the past eight years, the animal husbandry and dairying sector have experienced substantial growth, propelled by Prime Minister Modi's vision of 'Atmanirbhar Bharat'—a journey that truly reflects the remarkable achievement of self-reliance in this sector.

The Kokan Kapila breed is the sole supplier of milk in regions where there is a scarcity of dairy milk and limited transportation facilities. Konkan Kapila cows are widely used in the hot and humid coastal areas of Maharashtra. They thrive on natural feeds, primarily through grazing, and are well-suited to low-input production systems. These cattle exhibit remarkable endurance when grazing in rugged and challenging woodland terrains, showing no signs of fatigue.

In the fiscal year 2021–22, India accomplished a notable achievement in both its dairy and poultry sectors. The nation's overall milk production reached 221.06 million metric tons, showcasing an impressive annual growth rate of 5.29 percent. The leading milk-producing states were Rajasthan (15.05%), Uttar Pradesh (14.93%), Madhya Pradesh (8.06%), Gujarat (7.56%), and Andhra Pradesh (6.97%). Additionally, India's egg production for the same period reached 129.60 billion, marking a substantial increase of 6.19 percent from the

preceding year. Moreover, per-capita milk availability demonstrated significant improvement, reaching 444 grams per day an increase of 17 grams per day compared to the previous year. [pbi.gov.in] ^[1].

2. Methodology

2.1 Sampling Method

A multistage sampling technique was employed to draw samples for the study conducted in five stages. In the initial stage, Ratnagiri district was purposively chosen from the Konkan region of Maharashtra due to having the highest cattle population. Subsequently, tehsils, namely Dapoli, Khed, Mandangad, Chiplun, Guhaghar, and Sangmeshwar, were selected. The third stage involved the selection of five villages from each tehsil. The final sample unit comprised 90 milk producer families from which primary data were obtained.

2.2 Cost Concepts

2.2.1 Variable costs: Cost of feed and fodder, Labour wages, veterinary changes and miscellaneous charges etc.

2.2.2 Fixed cost: Interest on fixed capital, depreciation of fixed capital

2.2.3 Net Return: Gross return – total cost

2.2.4 Benefit cost ratio (BC): Gross return/ Total cost

Per liter cost of milk production: (Total cost – Value of by produce) / Total milk yield

3. Results and Discussion

3.1 Local cow (Kokan Kapila)

Table 1 revealed that during the intercalving period for local cows (Kokan Kapila), the total cost of milk production per animal stood at ₹ 39,828. Variable costs comprised 77.35 percent of the total, amounting to ₹ 30,806, while fixed costs accounted for ₹ 9,023, constituting 22.65 percent of the overall total cost. Analysis based on group size indicated an escalating total cost with larger herd sizes, reaching the highest for large groups at ₹ 40,377, followed by medium-sized groups at ₹ 39,795, and the lowest for small groups at ₹ 39,505. Wages for human labor emerged as the most substantial component, constituting 36.27 percent (₹ 14,446) of the total cost, followed by the cost of feed and fodder at 31.21 percent (₹ 12,433), veterinary expenses at 1.13 percent (₹ 452), and miscellaneous charges at 0.43 percent (₹ 175). In terms of the per-liter cost of milk production, it was observed to be highest in medium-sized groups at ₹ 56.14, followed by small groups at ₹ 54.91, with the lowest cost in large-sized groups at ₹ 53.96. The benefit-cost ratio was observed to be maximum in small groups at 0.98, followed by large groups at 0.97, and medium-sized groups at 0.96.

Table 1: Cost of Milk Production of Local cow (Kokan Kapila) in intercalving period

| Sr. No. | Particulars | Small | Medium | Large | Overall |
|---------|--|-------|--------|-------|---------|
| A | Variable cost | | | | |
| | Feed and Fodder | 12460 | 12424 | 12402 | 12433 |
| | Wages on human labour | 15460 | 14270 | 13095 | 14446 |
| | Veterinary expenses | 447 | 481 | 421 | 452 |
| | Miscellaneous expenses | 178 | 170 | 176 | 175 |
| | Variable cost | 28545 | 27344 | 26093 | 27506 |
| | Interest on working capital @ 12 percent | 3426 | 3282 | 3132 | 3301 |
| | Total Variable cost | 31971 | 30625 | 29224 | 30806 |
| B | Fixed cost | | | | |
| | Interest on fixed capital @ 10percent | 3412 | 4324 | 5278 | 4203 |
| | Depreciation on fixed assets | 4122 | 4847 | 5877 | 4820 |
| | Total Fixed Cost | 7534 | 9170 | 11154 | 9023 |
| C | Total cost | 39505 | 39795 | 40377 | 39828 |
| | Gross returns | 38968 | 38584 | 39289 | 38918 |
| | Milk Yield (lit.) | 559 | 547 | 550 | 553 |
| | Value of Dung | 8802 | 9082 | 9611 | 9105 |
| | Per liter cost of milk production | 54.91 | 56.14 | 53.96 | 55.55 |
| | Net profit | -537 | -1211 | -1088 | -909 |
| | Benefit cost ratio (B:C) | 0.98 | 0.96 | 0.97 | 0.97 |

3.2 crossbreed cow

It was observed in table 2 that the total cost of milk production per animal during the intercalving period for crossbreed cows was documented at ₹ 57,569. Variable costs constituted 76.83 percent of the total, totaling ₹ 44,233, while fixed costs comprised ₹ 13,336, accounting for 23.16 percent of the overall total cost. Upon group size analysis, it became apparent that the total cost decreased with larger herd sizes, reaching the highest for small groups, followed by medium groups, and the lowest for large groups. The predominant

component of the total cost was the cost of feed and fodder, making up 37.92 percent of the total cost (₹ 21,832), followed by wages for human labor at 29.19 percent (₹ 16,804), veterinary expenses at 1.18 percent (₹ 681), and miscellaneous charges at 0.30 percent (₹ 177). Concerning the per-liter cost of milk production, it was observed to be highest for small groups at ₹ 29.77, followed by medium groups at ₹ 24.91, and large groups at ₹ 21.88. On an overall level, the per-liter cost of milk production was ₹ 25.89. The benefit-cost ratio was noted to increase as the herd size increased.

Table 2: Cost of Milk production of Corssbreed cow in intercalving period

| Sr. No. | Particulars | Small | Medium | Large | Overall |
|---------|--|--------|--------|--------|---------|
| A | Variable cost | | | | |
| | Feed and Fodder | 22444 | 21648 | 21121 | 21832 |
| | Wages on human labour | 17716 | 17341 | 14654 | 16804 |
| | Veterinary expenses | 724 | 670 | 627 | 681 |
| | Miscellaneous expenses | 185 | 172 | 171 | 177 |
| | Variable cost | 41069 | 39831 | 36571 | 39494 |
| | Interest on working capital @ 12 percent | 4929 | 4780 | 4389 | 4740 |
| | Total Variable cost | 45998 | 44611 | 40960 | 44233 |
| B | Fixed cost | | | | |
| | Interest on fixed capital @ 10percent | 7463 | 4221 | 4167 | 5504 |
| | Total Fixed Cost | 14306 | 11848 | 13825 | 13336 |
| C | Total cost | 60303 | 56458 | 54784 | 57569 |
| | Gross returns | 102637 | 112037 | 119208 | 110110 |
| | Milk Yield (lit.) | 1748 | 1911 | 2008 | 1871 |
| | Value of Dung | 8252 | 8843 | 10829 | 9114 |
| | Per liter cost of milk production | 29.77 | 24.91 | 21.88 | 25.89 |
| | Net profit | 42335 | 55581 | 64424 | 52543 |
| | Benefit cost ratio (B:C) | 1.7 | 1.98 | 2.17 | 1.91 |

3.3 Buffalo

Table 3 represented that the total cost of milk production per animal during the intercalving period for buffaloes was recorded at ₹ 61,450. Variable costs comprised 75.36 percent of the total, amounting to ₹ 46,309, while fixed costs accounted for ₹ 15,142, representing 24.64 percent of the overall total cost. Group size analysis indicated that the total cost was highest for the medium-sized group, followed by the small group, and lowest for the large group. The primary component of the total cost was the cost of feed and fodder, constituting 36.08 percent of the total cost (₹ 22,177),

followed by wages for human labor at 29.78 percent (₹ 18,304), veterinary expenses at 1.10 percent (₹ 679), and miscellaneous charges at 0.30 percent (₹ 187). Regarding the per-liter cost of milk production, it was observed to be highest in the medium-sized group at ₹ 27.62, followed by the small group at ₹ 26.42, with the lowest cost in the large group at ₹ 23.77. On an overall level, the per-liter cost of milk production stood at ₹ 26.15 in the past. The benefit-cost ratio was observed to be maximum in the large group at 2.11, followed by 1.98 in the small group and 1.88 in the medium-sized group.

Table 3: Cost of milk production of buffalo in intercalving period

| Sr. No. | Particulars | Small | Medium | Large | Overall |
|---------|--|--------|--------|--------|---------|
| A | Variable cost | | | | |
| | Feed and Fodder | 21934 | 21926 | 22896 | 22177 |
| | Wages on human labour | 19927 | 19621 | 13989 | 18304 |
| | Veterinary expenses | 677 | 684 | 677 | 679 |
| | Miscellaneous expenses | 188 | 186 | 187 | 187 |
| | Variable cost | 42725 | 42416 | 37748 | 41347 |
| | Interest on working capital @ 12 percent | 5127 | 5090 | 4530 | 4962 |
| | Total Variable cost | 47852 | 47506 | 42278 | 46309 |
| B | Fixed cost | | | | |
| | Interest on fixed capital @ 10percent | 3852 | 5065 | 4398 | 4410 |
| | Depreciation on fixed assets | 9686 | 12211 | 10379 | 10733 |
| | Total Fixed Cost | 13538 | 17275 | 14777 | 15142 |
| C | Total cost | 61389 | 64781 | 57054 | 61450 |
| | Gross returns | 121713 | 122266 | 120822 | 121676 |
| | Milk Yield (lit.) | 1911 | 1893 | 1864 | 1893 |
| | Value of Dung | 10885 | 12480 | 12743 | 11909 |
| | Per liter cost of milk production | 26.42 | 27.62 | 23.77 | 26.17 |
| | Net profit | 60324 | 57486 | 63769 | 60227 |
| | Benefit cost ratio (B:C) | 1.98 | 1.88 | 2.11 | 1.98 |

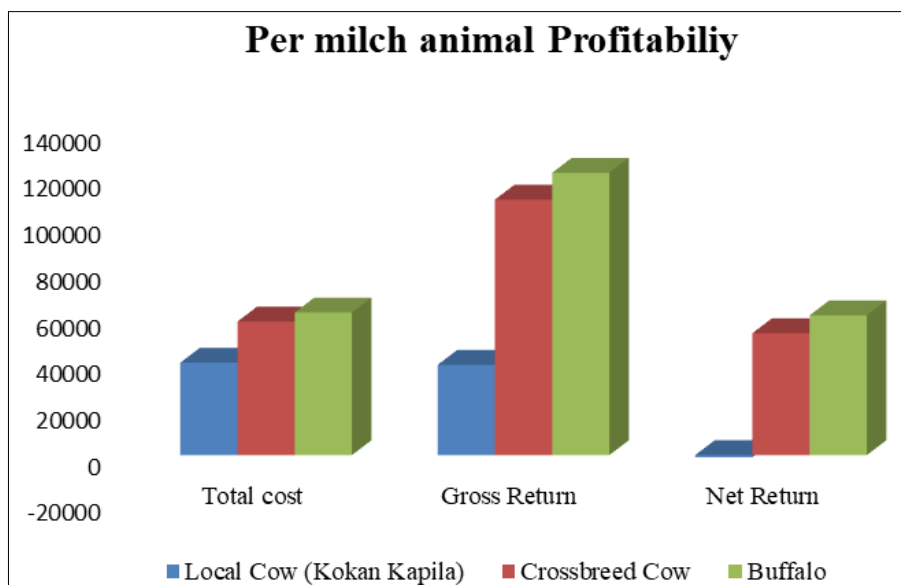
3.4 Profitability per milch animal at overall level

Table 4 provided insights into the historical profitability of milk production from various classes of milch animals, encompassing local cows, crossbred cows, and buffaloes at an overall level. Gross returns were reported as the highest for buffaloes (₹ 1,21,676), followed by crossbred cows (₹ 1,10,110), and local cows (Kokan Kapila) (₹ 28,918). Net returns at variable cost also exhibited the highest figures for

buffaloes (₹ 75,367), followed by crossbred cows (₹ 65,887), and local cows (Kokan Kapila) at ₹ 8112. Net returns at total cost were observed to be the highest for buffaloes at ₹ 60,226, followed by crossbred cows at ₹ 52,541. However, for local cows (Kokan Kapila), the net return at total cost was negative at ₹ 910 due to their lower productivity. The benefit-cost ratio for local cows, crossbred cows, and buffaloes was found to be 0.97, 1.91, and 1.98, respectively.

Table 4: Per animal profitability in milk production at overall level

| Sr. No. | Particular | Local Cow | Crossbreed Cow | Buffalo |
|---------|---------------------------|-----------|----------------|---------|
| 1 | Yield (lit) | 553 | 1871 | 1893 |
| 2 | Gross return (₹) | 38918 | 110110 | 121676 |
| 3 | Cost | | | |
| | i. Variable cost | 30806 | 44233 | 46309 |
| | ii. Fixed cost | 9023 | 13336 | 15142 |
| | iii. Total cost | 39828 | 57569 | 61450 |
| 4 | Net returns at (₹) | | | |
| | i. Variable cost | 8112 | 65877 | 75367 |
| | ii. Fixed cost | 29895 | 96774 | 106534 |
| | iii. Total cost | -910 | 52541 | 60226 |
| 5 | Benefit cost ratio | 0.97 | 1.91 | 1.98 |

**Fig 1:** Per milch profitability in milk production at overall level

4. Conclusion

In local cows (Kokan Kapila), the cost of milk production per animal amounted to ₹ 39,828, with ₹ 30,806 (77.35%) allocated to variable costs and ₹ 9,435 (22.65%) to fixed costs. Feed and fodder constituted 31.21% of the total cost, emphasizing their crucial role in milk production. The benefit-cost ratio stood at 0.97. For crossbreed cows, the cost of milk production per animal was ₹ 57,569, comprising ₹ 44,233 (76.83%) in variable costs and ₹ 13,336 (23.16%) in fixed costs. Feed and fodder played a significant role, representing 37.92% of the total cost, underscoring its importance in milk production and the benefit-cost ratio was 1.92. In the case of buffalos, the cost of milk production per animal was ₹ 61,450, with ₹ 46,309 (75.36%) attributed to variable costs and ₹ 15,142 (24.64%) to fixed costs. Feed and fodder constituted 36.08% of the total cost, emphasizing their pivotal role in milk production. The benefit-cost ratio was 1.98.

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