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Socio-economic status of dairy farmers rearing Kosali cattle in Balodabazar-Bhatapara District, Chhattisgarh, India

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Abstract

Dairy farming forms one of the principal livelihood sources for smallholders across rural Chhattisgarh, yet micro-level evidence on the socio-economic profile of dairy-keeping households at the block level remains scarce. This study examined the socio-economic conditions, cattle-management practices and perception towards the indigenous Kosali cattle breed among 65 dairy-farming households drawn from three blocks — Bhatapara (n = 38), Balodabazar (n = 8) and Simga (n = 19) — of Baloda Bazar–Bhatapara district, Chhattisgarh. A structured interview schedule was used to record demographic, occupational, herd-management and attitudinal information, and the resulting data were analysed using descriptive statistics (frequency, percentage, mean, standard deviation, standard error and confidence interval) together with chi-square tests to examine whether response patterns were homogeneously (randomly) or heterogeneously (aggregately) distributed across the three blocks. The results show that dairying is predominantly a male-led, joint-family, OBC-dominated activity carried on alongside crop agriculture; more than half of the respondents (53.8%) did not maintain any farm records, 41.5% lacked access to veterinary facilities, and 58.5% had received some form of government subsidy. Kosali cattle, the only registered indigenous breed of the state, were kept by the large majority of households, generally in small-to-medium numbers, yet 55.4% of respondents were not interested in expanding Kosali-based dairying, chiefly on account of low awareness (statistically an aggregated response, $\chi^2 = 24.10$, $p < 0.01$), inadequate marketing linkages and low milk yield relative to crossbred animals. The findings point to the need for block-differentiated extension strategies emphasising record-keeping, veterinary outreach, fodder support and structured awareness campaigns on the economic and climate-resilience value of the Kosali breed.

Keywords: Dairy farming, socio-economic status, Kosali cattle, Chhattisgarh, rural livelihoods

1. Introduction

Livestock rearing, and dairying in particular, occupies a central place in India's rural economy. India is currently the world's largest milk producer, accounting for close to a quarter of global output, with national milk production having risen from 146.3 million tonnes in 2014-15 to 239.3 million tonnes in 2023–24, an annual compound growth rate of roughly 5.6 per cent (DAHD, 2024; PIB, 2025) ^[1, 4]. Milk is now the single largest agricultural commodity in the country, contributing about five per cent of national GDP and directly employing more than eight crore farmers, a large proportion of whom are small and marginal landholders for whom dairying supplements or substitutes crop income (PIB, 2025) ^[4]. Because dairying can be practised on small landholdings with modest capital, it is widely regarded as one of the more accessible pathways of income diversification and poverty alleviation available to rural households, and it also provides substantial employment to women within the household economy (DAHD, 2024) ^[1].

Chhattisgarh, a predominantly agrarian state carved out of Madhya Pradesh in 2000, mirrors this national pattern: the majority of its rural population combines settled agriculture with livestock keeping, and cattle rearing is deeply interwoven with the socio-cultural life of farming communities in the state (Mooventhan, Kadian, Senthilkumar, & Karpagam, 2016) ^[2].

A distinctive feature of the state's livestock economy is the Kosali, the only cattle breed of Chhattisgarh formally registered by the National Bureau of Animal Genetic Resources. Kosali animals are comparatively small-bodied, dual-purpose (draught-cum-milch) animals that have evolved under the low-input, humid sub-tropical conditions of the Chhattisgarh plains, and are noted for heat tolerance, disease resistance and the ability to survive on locally available, often sub-optimal, feed resources (Rajput, Ingole, Chaurasia, Deshmukh, & Alam, 2025; Sao *et al.*, 2025) ^[5, 6]. While these traits make the breed a potentially valuable genetic resource for climate-resilient dairying, Kosali cows are also widely regarded by farmers as low milk-yielders compared with crossbred or exotic cattle, a perception that has implications for the breed's long-term conservation.

Socio-economic surveys of dairy farmers have been conducted in several parts of India, including tribal blocks of northern Chhattisgarh (Mooventhan *et al.*, 2016) ^[2] and the Bundelkhand region of Uttar Pradesh (Ojha & Kalia, 2021) ^[3], and these consistently report that herd size, record-keeping, access to veterinary care, fodder availability and participation in government schemes vary considerably not only between states but between blocks within the same district, reflecting differences in market access, infrastructure and extension coverage. However, published micro-level evidence specific to Baloda Bazar–Bhatapara district an important dairying belt of central Chhattisgarh is limited, and no study appears to have jointly examined the general socio-economic profile of dairy households alongside their specific engagement with, and perception of, the Kosali breed. Against this background, the present study was undertaken with the following objectives: (i) to describe the demographic and socio-economic characteristics of dairy-farming households in the Bhatapara, Balodabazar and Simga blocks of Balodabazar-Bhatapara district; (ii) to document cattle-ownership and management practices, including herd size, fodder use, vaccination, veterinary access and record-keeping; (iii) to assess the socio-economic impact of dairying and farmers' awareness of, and satisfaction with, the enterprise; and (iv) to evaluate farmers' perception of, and future plans regarding, the indigenous Kosali breed, and to identify the principal constraints they associate with it.

Materials and Methods

Study area: The study was conducted in Balodabazar-Bhatapara district of Chhattisgarh state, India. Three administrative blocks of the district; Bhatapara, Balodabazar and Simga were purposively selected on the basis of their relatively high concentration of dairy-keeping households and the presence of both crossbred and indigenous (Kosali) cattle populations.

Sampling design and sample size

A total of 65 dairy-farming households were surveyed across the three blocks: 38 respondents from Bhatapara block, 8 from Balodabazar block and 19 from Simga block. The unequal block-wise allocation reflects the differing density of dairy households identified during the reconnaissance/listing stage in each block; respondents within each block were selected using a random sampling procedure from the list of dairy-keeping households.

Data collection

Primary data were collected through personal interviews using a pre-tested, structured interview schedule covering four

broad domains: (i) demographic and socio-economic characteristics (gender, age, social category, marital status, family type and size, education, occupation and annual income); (ii) cattle-ownership and management practices (herd size, number of Kosali cows owned, milk yield, fodder type, vaccination frequency, access to veterinary facilities, record-keeping, utilisation of cow dung, government subsidy receipt and major constraints); (iii) socio-economic impact and awareness (type of dairy farm, perceived change in economic condition, mode of milk marketing, training participation, source of information and self-rated knowledge/satisfaction levels); and (iv) perception of, and future plans regarding, Kosali cattle (interest in raising the breed, expectations from government support, future plans for the dairy enterprise and perceived challenges specific to Kosali-based dairying).

Statistical analysis

Data were coded, tabulated and summarized using frequencies and percentages for categorical variables and mean, variance, standard deviation (SD), standard error (SE) and 95% confidence interval for quantitative indicators, computed separately for each block. To assess whether the distribution of responses for a given parameter differed meaningfully across the three blocks (an “aggregated”, block-specific pattern) or was statistically indistinguishable from a uniform/random spread across blocks, a chi-square (χ^2) test with 2 degrees of freedom was applied to each parameter; a response category was classified as “Aggregated” when the calculated χ^2 value was significant at $p \leq 0.05$, and as “Random” when the block-wise distribution did not differ significantly from expectation. All analyses were performed using standard spreadsheet-based statistical routines.

Results and Discussion

Demographic and socio-economic profile

Table 1 presents the block-wise and pooled demographic profile of the 65 sampled dairy households. Male respondents outnumbered female respondents in all three blocks, with the overall sample being 63.1% male and 36.9% female; the male share was highest in Simga (73.7%) and lowest in Bhatapara (57.9%). This pattern is consistent with earlier reports that day-to-day decision-making in Indian dairy households, including on matters of milk sale and herd management, continues to rest predominantly with male members even though women contribute substantially to hands-on animal care (cf. observations on decision-making roles among dairy cooperative members in Rajasthan). Age-wise, the middle-aged groups (26–40 and 41–55 years) together accounted for over half the sample (58.5%), suggesting that dairying in the study area is carried on mainly by farmers in their economically active years.

With respect to social category, Other Backward Classes (OBC) formed the single largest group (46.2%), followed by Scheduled Castes (23.1%), Scheduled Tribes (16.9%) and the General category (13.8%); OBC dominance was particularly pronounced in Balodabazar (62.5%) and Simga (47.4%). Almost the entire sample was married (95.4%), and joint families outnumbered nuclear families overall (58.5% versus 41.5%), a family structure that is often associated with greater availability of household labour for animal husbandry tasks. Educational attainment was mixed: about one-fifth of respondents (21.5%) were illiterate, while the remainder were distributed fairly evenly across primary, secondary and graduate levels. In terms of occupation, exclusive dependence

on dairying (32.3%) and combined agriculture-plus-dairying (36.9%) together accounted for the majority of households, underlining the complementary rather than stand-alone role that dairying plays within the wider farm economy. Annual household income was concentrated in the lower-to-middle

slabs, with 44.6% of households earning below Rs. 1 lakh per year, indicating that, notwithstanding its widespread practice, dairying in the study area has yet to translate into substantial income gains for a large share of households.

Table 1: Demographic and socio-economic profile of sampled dairy households (N = 65)

Parameter	Bhatapara (n=38)	Balodabazar (n=8)	Simga (n=19)	Total (N=65)
Gender- Female	16 (42.1%)	3 (37.5%)	5 (26.3%)	24 (36.9%)
Gender -Male	22 (57.9%)	5 (62.5%)	14 (73.7%)	41 (63.1%)
Age 26–40 yr	10 (26.3%)	4 (50.0%)	5 (26.3%)	19 (29.2%)
Age 41–55 yr	12 (31.6%)	3 (37.5%)	4 (21.1%)	19 (29.2%)
Age above 55 yr	11 (29.0%)	1 (12.5%)	4 (21.1%)	16 (24.6%)
Age below 25 yr	5 (13.2%)	0 (0.0%)	6 (31.6%)	11 (16.9%)
Category- SC	9 (23.7%)	1 (12.5%)	5 (26.3%)	15 (23.1%)
Category- OBC	16 (42.1%)	5 (62.5%)	9 (47.4%)	30 (46.2%)
Category- General	7 (18.4%)	0 (0.0%)	2 (10.5%)	9 (13.8%)
Category -ST	6 (15.8%)	2 (25.0%)	3 (15.8%)	11 (16.9%)
Marital status-Married	38 (100%)	7 (87.5%)	17 (89.5%)	62 (95.4%)
Marital status -Unmarried	0 (0.0%)	1 (12.5%)	2 (10.5%)	3 (4.6%)
Family type -Nuclear	16 (42.1%)	3 (37.5%)	8 (42.1%)	27 (41.5%)
Family type -Joint	22 (57.9%)	5 (62.5%)	11 (57.9%)	38 (58.5%)
Education- Illiterate	8 (21.1%)	3 (37.5%)	3 (15.8%)	14 (21.5%)
Education-Primary	9 (23.7%)	1 (12.5%)	6 (31.6%)	16 (24.6%)
Education-Secondary	11 (28.9%)	1 (12.5%)	6 (31.6%)	18 (27.7%)
Education- Graduate	10 (26.3%)	3 (37.5%)	4 (21.1%)	17 (26.2%)
Occupation- Agriculture only	15 (39.5%)	1 (12.5%)	4 (21.1%)	20 (30.8%)
Occupation-Dairy only	11 (29.0%)	4 (50.0%)	6 (31.6%)	21 (32.3%)
Occupation-Both	12 (31.6%)	3 (37.5%)	9 (47.4%)	24 (36.9%)
Income-below Rs. 50,000	9 (23.7%)	1 (12.5%)	3 (15.8%)	13 (20.0%)
Income-Rs. 50,000–1 lakh	5 (13.2%)	2 (25.0%)	3 (15.8%)	10 (15.4%)
Income- Rs. 1–2 lakh	10 (26.3%)	1 (12.5%)	1 (5.3%)	12 (18.5%)
Income-Rs. 2–4 lakh	8 (21.1%)	2 (25.0%)	6 (31.6%)	16 (24.6%)
Income-above Rs. 4 lakh	6 (15.8%)	2 (25.0%)	6 (31.6%)	14 (21.5%)

Cattle ownership and dairy-management practices

Table 2 summarizes herd-management practices. Herd size was fairly evenly split between small (1–5 cows, 35.4%), medium (6–10 cows, 32.3%) and large (11–15 cows, 32.3%) categories overall, though Balodabazar households skewed towards large herds (50.0%). Kosali cattle were present in the great majority of households: only 9.2% of respondents (all in Bhatapara) reported owning no Kosali cows, while 36.9% kept a medium number (4–7 animals). Green, dry and grain-based feeding were all practised, with green fodder the single most common category overall (30.8%), followed by grain (24.6%) and mixed/all-type feeding (27.7%); the chi-square test indicated that the pattern of green-fodder use differed significantly across blocks ($\chi^2 = 7.60$, $p = 0.02$), reflecting differential local fodder availability.

Animal health management practices point to important service gaps. Slightly over half of respondents (53.8%) kept no written records of their dairy enterprise, and this lack of record-keeping was statistically aggregated rather than randomly distributed across blocks ($\chi^2 = 9.66$ –14.00, $p < 0.01$ for the 'No' category), indicating that record-keeping is a block-specific rather than uniformly distributed shortfall. Vaccination coverage was similarly uneven: 35.4% of farmers reported never vaccinating their animals and an equal share vaccinated only occasionally, leaving less than a third

(29.2%) on a regular vaccination schedule. Correspondingly, 41.5% of households reported no access to veterinary facilities and a further 24.6% had only occasional access, so that fewer than one in three households (33.8%) enjoyed reliable veterinary support. These findings echo constraints reported for milk producers in other Indian states, where inadequate veterinary and artificial-insemination services, alongside feed and fodder shortages, are consistently identified among the foremost technical constraints facing smallholder dairy farmers.

Cow dung was put to productive use by virtually all households, chiefly as farmyard manure for agriculture (49.2%), followed by sale (33.8%) and composting (16.9%) — a pattern broadly consistent with the mixed crop–livestock character of farming in the district. When asked about the principal constraint in dairy farming, low milk production was the single most frequently cited difficulty (27.7%), followed closely by a combined constraint of fodder shortage, low production and poor veterinary service together (26.2%) and poor veterinary services alone (24.6%), reinforcing the health-service and productivity gaps noted above. Despite these constraints, a majority of households (58.5%) reported having received some government subsidy related to dairying, with the highest coverage in Balodabazar (87.5%).

Table 2: Cattle ownership and dairy-management practices (N = 65)

Parameter	Bhatapara (n=38)	Balodabazar (n=8)	Simga (n=19)	Total (N=65)
Milk yield — below 1 L/day	11 (28.9%)	2 (25.0%)	6 (31.6%)	19 (29.2%)
Milk yield — 1–2 L/day	11 (28.9%)	0 (0.0%)	7 (36.8%)	18 (27.7%)
Milk yield — 2–4 L/day	8 (21.1%)	4 (50.0%)	4 (21.1%)	16 (24.6%)
Milk yield — above 4 L/day	8 (21.1%)	2 (25.0%)	2 (10.5%)	12 (18.5%)
Record maintenance No	19 (50.0%)	4 (50.0%)	12 (63.2%)	35 (53.8%)
Record maintenance — Yes	19 (50.0%)	4 (50.0%)	7 (36.8%)	30 (46.2%)
Herd size — Small (1–5)	14 (36.8%)	3 (37.5%)	6 (31.6%)	23 (35.4%)
Herd size — Medium (6–10)	11 (28.9%)	1 (12.5%)	9 (47.4%)	21 (32.3%)
Herd size — Large (11–15)	13 (34.2%)	4 (50.0%)	4 (21.1%)	21 (32.3%)
Kosali cows — None (0)	6 (15.8%)	0 (0.0%)	0 (0.0%)	6 (9.2%)
Kosali cows — Low (1–3)	10 (26.3%)	2 (25.0%)	4 (21.1%)	16 (24.6%)
Kosali cows — Medium (4–7)	15 (39.5%)	3 (37.5%)	6 (31.6%)	24 (36.9%)
Kosali cows — High (8–10)	7 (18.4%)	3 (37.5%)	9 (47.4%)	19 (29.2%)
Fodder — Dry	6 (15.8%)	0 (0.0%)	5 (26.3%)	11 (16.9%)
Fodder — Grain	7 (18.4%)	5 (62.5%)	4 (21.1%)	16 (24.6%)
Fodder — Green	12 (31.6%)	2 (25.0%)	6 (31.6%)	20 (30.8%)
Fodder — All types	13 (34.2%)	1 (12.5%)	4 (21.1%)	18 (27.7%)
Vaccination — Never	13 (34.2%)	4 (50.0%)	6 (31.6%)	23 (35.4%)
Vaccination — Occasional	15 (39.5%)	2 (25.0%)	6 (31.6%)	23 (35.4%)
Vaccination — Regular	10 (26.3%)	2 (25.0%)	7 (36.8%)	19 (29.2%)
Veterinary access — No	18 (47.4%)	3 (37.5%)	6 (31.6%)	27 (41.5%)
Veterinary access — Occasional	8 (21.1%)	2 (25.0%)	6 (31.6%)	16 (24.6%)
Veterinary access — Yes	12 (31.6%)	3 (37.5%)	7 (36.8%)	22 (33.8%)
Cow dung use — Agriculture	19 (50.0%)	6 (75.0%)	7 (36.8%)	32 (49.2%)
Cow dung use — Sell	14 (36.8%)	1 (12.5%)	7 (36.8%)	22 (33.8%)
Cow dung use — Compost	5 (13.2%)	1 (12.5%)	5 (26.3%)	11 (16.9%)
Received govt. subsidy — No	19 (50.0%)	1 (12.5%)	7 (36.8%)	27 (41.5%)
Received govt. subsidy — Yes	19 (50.0%)	7 (87.5%)	12 (63.2%)	38 (58.5%)

Socio-economic impact and awareness of dairy farming

Table 3 reports the block-wise pattern of socio-economic impact and awareness indicators; because certain response categories in the original schedule did not sum to the full block sample (a small proportion of respondents did not fall into any listed category for these particular items), results are presented block-wise rather than as pooled totals. The large majority of dairy enterprises were classified as rural in character in all three blocks, most markedly in Bhatapara (92.1% rural) and Simga (78.9% rural), while Balodabazar had a comparatively larger urban-oriented share (37.5%). Regarding the perceived economic impact of dairying, a plurality of respondents in every block reported some improvement (either “greatly” or “slightly”) in their economic condition, although a non-trivial share between 12.5% (Balodabazar) and 26.3% (Simga) reported a loss, underscoring that returns from dairying are not uniformly

positive and are sensitive to local input costs and milk prices. Milk marketing routes varied by block: direct sale to consumers and sale through local vendors were the two most common channels in Balodabazar and Simga, whereas dairy co-operatives played a comparatively larger role in Bhatapara. Somewhat more than a third to just under half of respondents in each block had attended a training programme on dairy farming, and Krishi Vigyan Kendras (KVKs) were the leading source of information in Balodabazar (37.5%) and Simga (47.4%), while media sources were more prominent in Bhatapara (34.2%). Self-rated knowledge of dairy farming was concentrated in the ‘average’ category across blocks, and satisfaction with income generated from dairying was mixed, with a substantial neutral response, particularly in Simga (42.1%), suggesting that many farmers view dairying as an acceptable but not clearly remunerative activity.

Table 3: Socio-economic impact and awareness (block-wise frequency and per cent)

Parameter	Bhatapara (n=38)	Balodabazar (n=8)	Simga (n=19)
Farm type — Rural	35 (92.1%)	5 (62.5%)	15 (78.9%)
Farm type — Urban	3 (7.9%)	3 (37.5%)	4 (21.1%)
Economic condition — Greatly improved	11 (28.9%)	1 (12.5%)	5 (26.3%)
Economic condition — Slightly improved	9 (23.7%)	3 (37.5%)	4 (21.1%)
Economic condition — Loss	7 (18.4%)	2 (25.0%)	5 (26.3%)
Marketing — Dairy co-operative	11 (28.9%)	0 (0.0%)	3 (15.8%)
Marketing — Direct to consumer	7 (18.4%)	3 (37.5%)	5 (26.3%)
Marketing — Local vendor	9 (23.7%)	3 (37.5%)	6 (31.6%)
Attended training — No	13 (34.2%)	3 (37.5%)	5 (26.3%)
Attended training — Yes	14 (36.8%)	3 (37.5%)	9 (47.4%)
Info source — Farmers/peers	9 (23.7%)	2 (25.0%)	3 (15.8%)
Info source — KVK	5 (13.2%)	3 (37.5%)	9 (47.4%)
Info source — Media	13 (34.2%)	1 (12.5%)	2 (10.5%)
Knowledge level — Poor	7 (18.4%)	2 (25.0%)	5 (26.3%)
Knowledge level — Average	11 (28.9%)	3 (37.5%)	4 (21.1%)
Knowledge level — Good	9 (23.7%)	1 (12.5%)	5 (26.3%)
Satisfaction — Not satisfied	7 (18.4%)	2 (25.0%)	3 (15.8%)
Satisfaction — Neutral	10 (26.3%)	2 (25.0%)	8 (42.1%)
Satisfaction — Satisfied	10 (26.3%)	2 (25.0%)	3 (15.8%)

Perception and future plans regarding the Kosali breed

Table 4 presents farmers' perception of, and future orientation towards, Kosali cattle. More respondents than not were disinclined to expand Kosali-based dairying: 55.3% in Bhatapara and 52.6% in Simga were not interested in raising the breed further, whereas a majority in Balodabazar (62.5%) expressed interest. When asked what form of government support would most encourage them, a combined package of subsidy, training and veterinary services was the single most frequently chosen option in Bhatapara (36.8%) and Balodabazar (50.0%), while in Simga subsidy alone was most often preferred (36.8%) a distinction that, per the chi-square results, reflects a genuinely block-specific (aggregated) pattern for the combined-support category ($\chi^2 = 9.09$, $p = 0.01$) rather than chance variation.

Future plans for the dairy enterprise were fairly evenly divided between expanding the business and maintaining the current status in Bhatapara and Balodabazar, but in Simga a notably larger share of farmers (42.1%) indicated an intention

to leave dairy farming altogether, more than double the corresponding share in Bhatapara (21.1%). Regarding challenges specific to Kosali-breed dairying, lack of awareness about the breed's qualities was the most frequently cited constraint in Bhatapara (44.7%) and was statistically the most strongly aggregated (block-differentiated) response in the entire perception module ($\chi^2 = 24.10$, $p < 0.01$), while marketing difficulties (36.8%) and government-support gaps (37.5%) were more prominent concerns in Simga and Balodabazar respectively. Low milk yield relative to crossbred cattle was cited by roughly a quarter to a third of respondents across blocks, consistent with the breed's known dual-purpose, low-input phenotype rather than a high-yielding dairy phenotype (Rajput *et al.*, 2025; Sao *et al.*, 2025) [5, 6].

Taken together, these results suggest that low awareness, rather than an intrinsic dislike of the breed or unwillingness to keep cattle in general, is the single largest barrier to greater farmer investment in Kosali cattle, a finding with direct implications for extension and conservation strategy.

Table 4: Perception and future plans towards Kosali-breed dairy farming (block-wise frequency and per cent)

Parameter	Bhatapara (n=38)	Balodabazar (n=8)	Simga (n=19)
Interest in raising Kosali — No	21 (55.3%)	3 (37.5%)	10 (52.6%)
Interest in raising Kosali — Yes	17 (44.7%)	5 (62.5%)	9 (47.4%)
Govt. support wanted — Subsidy only	6 (15.8%)	2 (25.0%)	7 (36.8%)
Govt. support wanted — Training only	9 (23.7%)	0 (0.0%)	3 (15.8%)
Govt. support wanted — Veterinary services only	9 (23.7%)	2 (25.0%)	5 (26.3%)
Govt. support wanted — Subsidy + training + veterinary	14 (36.8%)	4 (50.0%)	4 (21.1%)
Future plan — Expand dairy business	15 (39.5%)	3 (37.5%)	4 (21.1%)
Future plan — Maintain current status	15 (39.5%)	4 (50.0%)	7 (36.8%)
Future plan — Leave dairy farming	8 (21.1%)	1 (12.5%)	8 (42.1%)
Kosali challenge — Lack of awareness	17 (44.7%)	1 (12.5%)	2 (10.5%)
Kosali challenge — Govt.-support gap	7 (18.4%)	3 (37.5%)	4 (21.1%)
Kosali challenge — Low milk yield	6 (15.8%)	2 (25.0%)	6 (31.6%)
Kosali challenge — Marketing difficulty	8 (21.1%)	2 (25.0%)	7 (36.8%)

Table 5: Selected chi-square (χ^2 , d.f. = 2) results across blocks

Parameter (response category)	χ^2 value	p-value	Distribution pattern
Milk yield: below 1 L/day	6.42	0.04	Random
Record maintenance: No	9.66	0.01	Aggregated
Herd size: Small (1–5 cows)	8.43	0.01	Aggregated
Kosali cows owned: Medium (4–7)	9.75	0.01	Aggregated
Kosali cows owned: None	12.00	0.00	Aggregated
Fodder type: Green	7.60	0.02	Aggregated
Vaccination: Never	5.83	0.05	Random (borderline)
Veterinary facility: No	14.00	0.00	Aggregated
Cow dung use: Agriculture	9.81	0.01	Aggregated
Received subsidy: No	8.00	0.02	Aggregated
Farm type: Rural	25.45	0.00	Aggregated
Govt. support wanted: Subsidy+training+vet	9.09	0.01	Aggregated
Future plan: Expand dairy business	12.09	0.00	Aggregated
Kosali challenge: Lack of awareness	24.10	0.00	Aggregated

Note: “Aggregated” indicates a statistically significant chi-square value ($p \leq 0.05$), i.e., the response category is not evenly/randomly distributed across the three blocks but is concentrated in a block-specific manner; “Random” indicates no significant departure from an even distribution across blocks.

Conclusion

This study provides a block-level socio-economic profile of dairy farmers in Baloda Bazar–Bhatapara district, Chhattisgarh, and shows that, notwithstanding the near-universal practice of cattle rearing alongside crop agriculture, several structural gaps continue to limit the sector's contribution to household income. More than half of the sampled households did not maintain dairy-enterprise records, a similar proportion lacked reliable veterinary access, and vaccination coverage remained inconsistent — constraints

that were not uniformly distributed but concentrated in particular blocks, most notably Bhatapara and Simga. Kosali cattle, the state's sole registered indigenous breed, were widely kept but in modest numbers, and farmer interest in expanding Kosali-based dairying was tempered chiefly by low awareness of the breed's qualities, perceived low milk yield and weak marketing linkages rather than outright disinterest in cattle-keeping.

These findings suggest three practical directions for local extension and policy. First, block-differentiated rather than

uniform interventions are warranted, since the chi-square results indicate that key constraints; record-keeping, veterinary access, and awareness of the Kosali breed in particular are statistically concentrated in specific blocks rather than spread evenly across the district. Second, strengthening veterinary outreach and structured vaccination schedules, alongside basic training in farm record-keeping, could help convert the widespread practice of dairying into more consistently profitable enterprises. Third, targeted awareness and market-linkage programmes around the Kosali breed building on its documented climate resilience and low input requirements (Rajput *et al.*, 2025; Sao *et al.*, 2025) ^[5, 6] — could help arrest the tendency towards reduced future investment in the breed observed in Simga block, and thereby support both farmer livelihoods and the in-situ conservation of this unique genetic resource. Future research with a larger, probability-based sample across the wider district, and including qualitative interviews with farmers who have discontinued dairying, would help to further validate and extend these findings.

Conflict of Interest

Not available

Financial Support

Not available

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