

Differences in Crossbred Cattle Management, Production and Contribution to Livelihood Security in South and North Karnataka

D. V. KOLEKAR AND M. J. CHANDRE GOWDA

ICAR-Agricultural Technology Application Research Institute, MRS, Hebbal, Bengaluru - 560 024

e-Mail : drdnyanesh45@gmail.com

AUTHORS CONTRIBUTION

D. V. KOLEKAR &
M. J. CHANDRE GOWDA :
Authors were involved in
writing and framing the
article

Corresponding Author :

D. V. KOLEKAR
ICAR - Agricultural
Technology Application
Research Institute, MRS,
Hebbal, Bengaluru

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ABSTRACT

Crossbred cattle have major contribution in fulfilling the demand of milk by the growing population of India. Among various categories of dairy animals, the productivity was higher in crossbred cattle. The present study was carried out in six districts of Karnataka based on sizable population of crossbred cattle. From each district, two taluks and from each taluk, a cluster of villages were identified based on crossbred cattle population. From each cluster of villages, 20 households owning crossbred cattle were randomly selected, making the total sample size of 240 farm households. The study revealed that the sample households had more number of milking crossbred cattle in south Karnataka as compared to north. Total feed cost and expenditure per animal was more in case of south Karnataka, producing more milk as compared to north. Net return/day per animal and per farm with and without considering cost of fodder were better in south Karnataka as compared to north. Employment generation (mandays/year) per animal was more in case of crossbred cattle of south as compared to north. However, protein, fat and calcium nourishment per animal to the family was better in north Karnataka. Nutrients to farm *i.e.* NPK kg/year/animal was also higher in north Karnataka. Economic and production constraints were expressed by more number of farmers compared to infrastructural and technical constraints. In all the categories, north Karnataka farmers expressed more constraints than in south Karnataka.

Keywords : Management, Crossbred cattle, Dairy farming, Livelihood

LIVESTOCK provides livelihood to two-third of rural community and provides employment to about 8.8 per cent of the population in India. India has vast livestock resources. Livestock sector contributes 4.11 per cent GDP and 25.6 per cent of total Agriculture GDP. India is World's highest livestock owner at about 536.76 million. Out of this, 193.47 million is cattle population *i.e.*, 142.11 million indigenous and 51.36 million crossbred cattle (as per 20th Livestock Census, 2019). India is the highest milk producer with 198.4 million tons (Pathak *et al.*, 2022). The per capita availability of milk has also increased from 112 grams per day in 1968-69 to 406 gram per day in 2019-20 (Basic Animal Husbandry Statistics, 2021). Crossbred cattle are playing crucial

role in the national economy through supply of milk, dung, fuel etc.

Karnataka stands 11th in milk production producing 90.31 lakh tonnes of milk in 2019-20. Hence dairying has become an important source of income for millions of rural families and has assumed an important role in providing employment and income generating opportunities. Karnataka state comprised about 9 per cent of crossbred cow population of the nation contributing more than 80 per cent of milk production in the state. Among cow milk, contribution of crossbred was immense (>75 per cent) than indigenous cows. Among various categories of dairy animals, the productivity was higher in crossbred

cows, followed by buffaloes, non-descript cows and goat. The milk productivity of crossbred cow was slightly lower in Karnataka when compared to the national average (Basic Animal Husbandry Statistics, 2021). Within the state, there were differences in productivity and profitability in different regions. Considering the above facts, present study entitled 'Differences in crossbred cattle management, production and contribution to livelihood security in South and North Karnataka' was undertaken.

MATERIAL AND METHODS

The present study was carried out purposively in the state of Karnataka. The sampling scheme adopted for this study was three-stage stratified random sampling without replacement. Three districts from south and three from north Karnataka were identified based on sizable population of crossbred cattle. Next, from each district, two taluks and within each taluk, one cluster of village/panchayat were identified based on population density of crossbred cattle. From each selected cluster, 20 households owning crossbred cattle during the survey were selected randomly to serve as the sample. One adult member or head of the household actively engaged in management of crossbred cattle was considered as the respondent. Thus, 20 cattle owners from each cluster, made a total of cattle owners sample size to 240.

The data were collected through semi-structured interview schedule. Information on production and livelihood security parameters was collected and analyzed for estimating the costs, returns from milk production and contribution in livelihood security of farmers from crossbred breeds. The statistical significance of differences in production parameters were tested by using 'z' test with the help of SPSS software. Livelihood security is operationalized as contribution made by crossbred breeds in terms of income generation, nourishment to the family, nutrients to farm, employment generation, security during uncertainties and social status symbol. The index developed by Biradar *et al.* (2013) was used with required modifications as given below:

- *Contribution to the Total Household Income* : The net return was measured by collecting information on different production values of each cow and average values of each parameter were calculated.
- *Nourishment to the Family* : Based on the daily average milk consumed by the family, the nutrients were computed in terms of protein, fat and calcium as suggested by Gopalan *et al.* (1971).
- *Nutrients to the Farm* : The average farm yard manure applied to their respective farm was converted in terms of N, P and K by following the conversion factors suggested by Gautam (2007), that is, one tonne of farm yard manure was equivalent to 8 Kg N, 4 Kg P₂O₅ and 16 Kg K₂O.
- *Employment Generation* : Number of hours engaged in crossbred cattle rearing for one year was collected. Total hours spent in a year were divided by 8 hours to convert them in to man-days. Total number of man-days contributed was expressed as mean values.
- *Security during Uncertainties* : Number of households having used crossbred cattle to face the uncertainties in the past two years.
- *Status Symbol* : The number of households who regard keeping crossbred cattle as symbol of social status.

RESULTS AND DISCUSSION

Data on age, caste, education, family size, landholding, farming experience and income given in Table 1 indicated that majority of cattle owners of both the regions belonged to middle age group and were from general category. Only a smaller portion of the respondents represented SC category. As younger generation is preferring jobs in urban areas, most of the farming practices are shouldered by middle age group. However, sizable population of ST category was involved in dairying in north Karnataka which may be due to accessibility to better resources as compared to south. The majority of cattle owners of both the regions were having high school or intermediate level of education.

TABLE 1
Socio-economic characteristics of cattle owners of south and north Karnataka

Socio-economic characteristics	Category	South % n=120	North % n=120	P value
Age	Young	17.50	30.00	0.066
	Middle	50.00	45.00	
	Old	32.50	25.00	
Caste	General	50.00	65.83	0.000
	OBC	43.33	20.83	
	SC	6.67	5.83	
	ST	0.00	7.50	
Education	Illiterate	25.00	8.33	0.000
	Primary	4.17	12.50	
	High School/Inter.	65.00	66.67	
	Graduate & above	5.83	12.50	
Family size	Small	65.83	34.17	0.000
	Medium	30.00	49.17	
	Large	4.17	16.67	
Land Holding	Landless	0.00	1.67	0.000
	Marginal	38.33	15.83	
	Small	46.67	20.00	
	Medium	10.83	17.50	
	Large	4.17	45.00	
Experience	Low	23.33	32.50	0.123
	Medium	50.00	37.50	
	High	26.67	30.00	
Annual Income	Low	96.67	64.17	0.000
	Medium	3.33	15.00	
	High	0.00	20.83	

There were illiterate respondents and also graduates, although few in numbers. Majority of cattle owners of south Karnataka lived in small families and owned small land holding, while that of north Karnataka was having medium family size as well as large land holding. The annual income of majority cattle owners was low despite majority farmers had medium to high level of experience in cattle farming. Chi-square test was used to test the association between farmers of different districts and socio-economic characteristics. It was found that

farmer categories of different districts were significantly ($p < 0.05$) associated with socio-economic characteristics such as caste, education, family size, land holding and annual income.

Management Practices

Stall feeding with hay, green fodder and concentrates was the most common practice followed by open grazing during day time. Sizable households were feeding mineral mixture, but very few adopted the practice of silage feeding. All the crossbred cattle

TABLE 2
Management practices followed for crossbred cattle in south and north Karnataka

Management practices	South % n=120	North % n=120	P Value
Natural service	0.83	1.67	0.561
Artificial insemination	100.00	100.00	NA
Open grazing	70.00	61.67	0.174
Stall feeding	100.00	100.00	NA
Feeding concentrates	100.00	100.00	NA
Feeding green fodder	100.00	100.00	NA
Mineral mixture feeding	44.17	35.83	0.188
Silage feeding	3.33	0.00	0.044
Hay feeding	100.00	100.00	NA
Closed type of housing	65.00	45.00	0.002
Pucca structure of housing	27.50	36.67	0.128
Location of housing as adjacent of house	44.17	30.83	0.033
Roof of thatch	68.33	23.33	0.000
Roof of asbestos	23.33	70.00	0.000
Open sides ventilation	49.17	50.00	0.897
Stone walls	33.33	40.00	0.284
Brick walls	48.33	27.50	0.001
Plastered wall surface	35.00	45.83	0.087
Concrete floor	36.67	43.33	0.292
Constructed feed manger	42.50	34.17	0.184
Tank watering	27.50	44.17	0.007
Drainage	84.17	87.50	0.459
Twice daily shed cleaning	63.33	60.83	0.690
Day and night confinement	44.17	75.00	0.000
Special protection of newborn calf	75.00	57.50	0.004
Vaccination	81.67	70.00	0.035
Deworming of adult	53.33	45.00	0.197
Deworming of calves	75.00	35.83	0.000
Allowing new born to suckle colostrum within 30 minutes	97.50	99.17	0.313
Disinfection of the naval cord	46.67	22.50	0.000
Proper dispose of dung and urine	90.83	92.50	0.640
Ecto-parasite control measure	73.33	33.33	0.000
Treatment of sick animal by Veterinarians	72.50	60.83	0.055
Trimming of hoof	27.50	17.50	0.064
Horn polishing	11.67	35.00	0.000
Regular cleaning of animal	90.00	84.17	0.178
Cleaning animal shed	99.17	95.00	0.055
Disbudding	33.33	22.50	0.061
Full hand milking method followed	84.17	66.67	0.002
Clean milking method practiced	85.83	35.83	0.000

in the sampling households was provided with Artificial Insemination (AI). This may be due to easy accessibility of AI services through Animal Husbandry Department. Majority adopted closed housing, with either thatch or asbestos roofing. Stone or brick-walls had open sides or windows, mostly without plastering. Concrete floor and feed manger were less common. But majority cattle-sheds had good drainage with shed cleaning done twice daily. In majority cases, animals were confined during night in south and day-night in north which shows that day grazing is a common practice in south. Adoption of health care practices such as vaccination, ecto-parasites control, deworming was better in case of south Karnataka as compared to north. The major reason could be the less awareness among farmers about vaccination and deworming and non access of veterinary services to farmers located in interior and remote areas in case of north. Most newborn were allowed to suckle colostrum within 30 minutes, but disinfection of naval cord was not practiced by majority farmers. Treatment of sick animal was done mostly by veterinarians. Under general practices, majority farmers were regularly cleaning animals and animal shed, but few were following trimming of hoof, disbudding and horn polishing. Majority farmers adopted clean milk production with either full hand milking or full hand

and stripping in south Karnataka, but in north Karnataka clean milk production practices was less adopted.

Reproductive Parameters

Reproductive parameters of crossbred cattle were ascertained based on the data related to age of puberty, age at first calving, lactation length, dry period, productive life span, inter calving period, conception rate, service period, insemination time and no. of inseminations required to conceive. The average values of the reproduction parameters are presented in Table 3. There was no significant difference with respect to age of puberty, age at first calving, lactation length, dry period, inter calving period, service period and no. of inseminations required to conceive between south and north Karnataka. The productive life span was two years more in north Karnataka (11.76 years) than in south (9.67 years). Conception rate was better in south Karnataka as each animal required 2.66 services per conception compared to north (2.90 services/conception). This could be due to poor quality semen or more reproductive disorders in north Karnataka. Whereas insemination time was better in north Karnataka (9.10 hrs) as compared to south (12.13 hrs). Differences were significantly different in respect of

TABLE 3
Reproduction parameters of crossbred cattle in south and north Karnataka

Parameter	South		North		P value
	Mean	SD	Mean	SD	
Age of puberty (Yrs)	1.83	0.32	1.87	0.31	0.301
Age at first calving (Yrs)	2.82	0.35	2.90	0.30	0.049
Lactation length (Months)	8.87	0.98	8.61	1.17	0.069
Dry period (Months)	4.09	1.57	3.95	1.06	0.414
Productive life span (Yrs)	9.67	1.35	11.76	1.73	0.000
Inter calving period (Months)	15.68	1.82	15.83	1.55	0.491
Conception rate (No. of service)	2.66	0.52	2.90	0.47	0.000
Service period (Months)	4.33	1.02	4.29	0.90	0.763
Insemination time (hrs)	12.13	2.72	9.10	2.32	0.000
No. of inseminations carried out	1.21	0.44	1.13	0.33	0.116

productive life span, conception rate and insemination time.

Production Parameters

On the parameters related to dairy production (Table 4), the sample households had more number of milking per day (1.98) in south as compared to north (1.34). Crossbred cattle were producing more milk (7.33 L/anim./day) in south as compared to north (6.33 L/day). Average quantity of dry fodder and concentrates fed per animal was 7.11 & 3.33 kg respectively in south as compared to 7.00 & 2.88 kg respectively of north. But, average quantity of green fodder fed per animal was less (16.50 kg) in south as compared to north (18.44 kg). Thus, total feed cost and expenditure per animal was more in south Karnataka (Rs.106.52 & 140.52, resp.) than in north Karnataka (Rs.101.75 & 135.71, resp.). Crossbred cattle required less expenditure on health per day/animal (Rs.4) but the net return/day

per animal (Rs.64.81) was more in south as compared to north (Rs.41.39). This was because of more productivity of dairy animals, more awareness, less resource constraints including availability of good quality fodder and grazing lands due to high rainfall in south Karnataka as compared to north Karnataka.

Majority of the cattle owners used own farm grown dry and green fodder to feed their cattle or from grazing. Without considering the cost of fodder as shown in Table 4, total feed cost (Rs/anim./day) was more in case of crossbred cattle in south (53.33) as compared to north (46.07). Thus, total expenditure (Rs/anim./day) was more in case of crossbred cattle (87.33) in south as compared to north (80.03). Net return/day per animal (Rs.118) was more in case of crossbred cattle in south as compared to north (Rs.97.07). Dung produced (25.20 to 25.25 Kg/day/animal) was used as manure in own farm. Consumption of milk provided nourishment to family (0.10 & 0.28

TABLE 4
Production parameters of crossbred cattle in south and north Karnataka

Parameter	South		North		P value
	Mean	SD	Mean	SD	
Total milking animals (no.)	1.98	1.48	1.34	0.97	0.000
Total milk production (L/day)	14.61	13.24	8.50	6.25	0.000
Total milk production (L/anim./day)	7.33	1.37	6.33	0.87	0.000
Total dry fodder fed (kg/anim./day)	7.11	1.74	7.00	2.32	0.694
Total daily green fodder fed (kg/anim./day)	16.50	6.10	18.44	4.37	0.005
Total concentrate fed (kg/anim./day)	3.33	0.72	2.88	0.79	0.000
Total feed cost (Rs/anim.)	106.52	19.23	101.75	17.52	0.046
Labour cost (Rs/anim./day)	30.00	.000a	30.00	.000a	Na
Health cost (Rs/anim./day)	4.00	.000a	4.00	.000a	Na
Total expenditure (Rs/anim./day)	140.52	19.23	135.71	17.48	0.044
Net return/anim. (Rs./day)	64.81	31.17	41.39	20.05	0.000
Milk nourishment to the family (L/day)	0.10	0.43	0.28	0.55	0.005
Employment generation (hrs/day)	1.82	0.32	1.69	0.41	0.008
Dung production (Kg/day/anim.)	25.20	3.37	25.25	3.73	0.906
Without considering cost of fodder					
Total feed cost (Rs/anim./day)	53.33	11.56	46.07	12.66	0.000
Total expenditure (Rs/anim./day)	87.33	11.56	80.03	12.61	0.000
Net return/anim. (Rs./day)	118.00	37.22	97.07	25.26	0.000

L/day in case of south & north). Similar results reported in western Maharashtra (Kolekar *et al.*, 2015). The 'z' test was used to test the difference between the production parameters perceived for crossbred cattle of south and north. Analysis showed that there was a significant difference between majority production parameters of two regions.

Contribution of crossbred cattle to the farmer's livelihood is presented in Table 5. Net return/day per animal (Rs.64.81) and per farm (Rs.127.50) was more in south as compared to north (Rs.41.39 & 55.74, respectively), as majority of the cattle owners used own farm grown dry and green fodder to feed their cattle or from grazing. Without considering the cost of fodder also, net return/day per animal (Rs.118) and per farm (Rs.234.88) was more in crossbred cattle of south as compared to north cattle (Rs.97.07 & 130.08 resp.). Protein, fat and calcium nourishment per animal to the family gm/day was less in case of crossbred cattle of south (3.2, 4.1 & 0.12, respectively) as compared to north (8.96, 11.48 & 0.34,

respectively). Similarly, nutrients supplied to farm *i.e.* NPK kg/year/animal was less in case of crossbred cattle of south (72.96, 36.48 & 145.92, respectively) as compared to north (73.6, 36.8 & 147.2, respectively). Employment generation (Man days/year) per animal was more in case of crossbred cattle of south (83.04) as compared to north (77.11). Security for uncertainties and status symbol was more in case of crossbred cattle of south (90.83% & 84.17%, respectively) as compared to north (71.25% & 75.41%, respectively). The 'F' & 'Chi-square' test was used to test the difference between the types of contribution perceived by farm households in case of crossbred cattle of south and north. Analysis showed that there was a significant difference between majority types of contribution of crossbred cattle of south and north Karnataka.

Constraints in Rearing of Cows

As per the data presented in Table 6, economic constraints were perceived by most of the respondents. High cost of treatment, high cost for feeding,

TABLE 5
Contribution of crossbred cattle to the farmers livelihood in south and north Karnataka

Type of contribution	Unit	Values		P Value
		South	North	
Income from cows	Net return/anim./day (Rs.)	64.81	41.39	0.000
	Net return/farm/day (Rs.)	127.50	55.74	0.000
	Net return/L (Rs.)	5.80	5.58	0.604
Income from cows (Without considering cost of fodder)	Net return/anim./day (Rs.)	118.00	97.07	0.000
	Net return/farm/day (Rs.)	234.88	130.08	0.000
	Net return/L (Rs.)	10.52	13.34	0.000
Nourishment to the Family	Protein (gm/day/family)	3.2	8.96	0.005
	Fat (gm/day/family)	4.1	11.48	0.005
	Calcium (mg/day/family)	120	336	0.005
Nutrients to the Farm	N kg/year	72.96	73.6	0.906
	P kg/year	36.48	36.8	0.906
	K kg/year	145.92	147.2	0.906
Generating Employment	Man days/year	83.04	77.11	0.008
Security for Uncertainties	Percentage	90.83	71.25	0.000
Status Symbol	Percentage	84.17	75.41	0.000

TABLE 6
Constraints in rearing of crossbred cattle in south and north Karnataka

Constraints	South %n=120	North %n=120	P Value
<i>Economic Constraints</i>			
High cost of treatment	94.17	100.00	0.007
High cost for feeding	92.50	100.00	0.002
Costly wages for workers	90.83	100.00	0.001
No access to credit facility	81.67	99.17	0.000
Poor economic condition	85.83	96.67	0.003
<i>Infrastructural Constraints</i>			
Poor supply of quality semen	34.17	68.33	0.000
Veterinary dispensary located at far away distance	20.83	58.33	0.000
Lack of organized market	32.50	53.33	0.001
Unavailability of veterinary services in time	36.67	47.50	0.089
<i>Technical Constraints</i>			
Poor mass media or extension agency contact	29.17	65.00	0.000
Unavailability of extension advisory services	30.00	63.33	0.000
Unavailability of improved technology	59.17	62.50	0.597
Lack of knowledge on improved practices	49.17	62.50	0.038
Not participated in any training programme	51.67	56.67	0.437
<i>Production Constraints</i>			
Longer inter-calving period	98.33	100.00	0.156
Competition from commercial dairy	97.50	75.83	0.000
Unavailability of grazing land	72.50	90.83	0.000
Uncertain rain fall	89.17	90.83	0.667
Poor milk production	74.17	89.17	0.653
Disease incidence	75.00	85.00	0.053
Longer maturity age	22.50	30.83	0.144
Lack of market demand for cow milk	23.33	25.83	0.003

costly wages for workers were perceived as major constraints by more than 90 per cent farmers of both the regions. Longer inter-calving period, competition from commercial dairy, non-availability of grazing land, uncertain rainfall and disease incidence were perceived as the production constraints by majority farmers. Major infrastructural constraint was the unavailability of veterinary services in time and poor supply of quality semen. Poor mass media or extension agency contact, non-participation in training programmes and unavailability of improved technologies were the major technical constraints

cited by the crossbred cattle farmers in both the regions, but more in north Karnataka.

Crossbred cattle were producing more milk (7.33 L/anim./day) in south Karnataka as compared to north (6.33 L/day). As a result, net return/day per animal (Rs.64.81) and per farm (Rs.127.50) was also more in crossbred cattle in south Karnataka as compared to north (Rs.41.39 & 55.74 resp.). Nutrients supply to farm *i.e.* NPK kg/year/animal from cross bred cattle was more in north Karnataka. Longer inter-calving period, high cost of treatment, high cost for feeding and costly wages for workers

were the important constraints perceived by farmers. The potential to enhance the productivity of the crossbred cattle of India through professional farm management and superior nutrition is immense. Therefore, there is need to make efforts for increasing production from crossbred cattle through proper breeding programs, good management practices etc. to hasten the efficiency of milk production and livelihood security of resource poor farmers.

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