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Research article

PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF DAIRYANIMALS IN KASHMIR HIMALAYAS- A GEOGRAPHICAL ANALYSIS IN GUREZ VALLEY OF JAMMU AND KASHMIR

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ABSTRACT: In order to establish future plan for dairy development different species of dairy animals were studied in high altitude region of Kashmir Himalayas to know the details about their productive performance. A total of 122 dairy animals were selected from Gurez valley which is situated at an altitude between 2460 to 3900 meters above msl and the average temperature varies between 25º to -20º during summer and winters respectively. Data on the productive and reproductive performance of 57 Local cows, 23 Crossbred cows, 22 Dzomo/Dzho and 20 Yaks were collected by questioning the owners about each animal specifically during 2015. Significant difference were found within the age at first calving, milk yield ($p<0.01$), lactation length ($p<0.01$), dry period ($p<0.01$), calving interval ($p<0.01$) and lactation yield ($p<0.01$) of different species of dairy animals in Gurez Valley of Kashmir Himalayas. The average age at first calving of local cows was found 40.11± 3.68 months, crossbreds 35.0 ± 2.00 months, Dzomo 45.0 ± 4.55 and Yak 48.37 ± 2.00 months respectively, with significant difference ($p<0.01$) .The mean milk yield of Local cows, Crossbred cows, Dzomo and Yak were found to be 2.66 ± 0.45, 6.28 ± 2.29, 2.58 ± 0.81 and 1.90 ± 0.60 litres/day respectively. The highest lactation length of 342.54 ± 25.33 days was recorded in local cows and the lowest of 295.34 ± 28.43 days was recorded in Yak. The lowest dry period of 129.12 ± 12.75 days was recorded in Crossbred cows and the highest of 229.69 ± 29.62 days was recorded in Yak. The lowest calving interval of 438.34 ± 13.55 days was found in Crossbred cows and the highest of 503.03 ± 63.22 days was found in Yak.
Key words: Dairy, Productive, Reproductive, Lactation Length, Dzomo, Calving Interval.

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INTRODUCTION

The world population was 6.1 billion, and it is estimated that there will be an increase to 8.2 billion people by 2030 [1]. The security of the food that will feed this growing population is a significant challenge. Recently, more than 3.7 billion people were faced with malnourishment. In 2010, it was determined that of these 3.7 billion, 925 million people, mostly in developing countries, were undernourished, and these numbers have been increasing worldwide since 1995 [2]. Agriculture plays a significant role in the improvement of food security worldwide by contributing to the growth of the economy in most developing countries of the world and thereby reducing poverty [3]. Livestock farming is an important sector of agriculture that contributes intensively to these aspects of food security. Livestock as an economic activity constitute even more important part of the agro-ecological and socio-economic system in the mountains areas, where crop production is constrained due to small land holdings, poor soil fertility, inclement weather and short growing season [4]. Among livestock, dairy farming has been considered as subsidiary to agriculture, however, during the last three decades, dairy cattle production has undergone a major transformation, thus resulting into substantial increase in milk production and dairying has become a viable tool to diversify the agricultural production [5].

Dairy animals are the best means to convert local vegetative biomass into useful products and work. Among all geographical factors that help to determine the development of dairy farming, climate plays a very significant role. It is primarily responsible for the formation of botanical environment. The suitability of a particular breed of animal with its climate depends on the quality of feed and fodder which is available naturally or which can be grown in that climate quite as much as on physiological adaptations of the breed to the climate. Thus, the importance of livestock in fragile ecosystems goes beyond its food production function [6].

Economy of animal production is closely associated with the biological efficiency of breeding. The production and reproductive performance of indigenous cattle is very low due to their genetic potentiality. Zebu animals are late maturing, both physiologically and sexually, and heat symptoms are weaker than in European cattle. The indigenous dairy animals usually do not let down milk unless stimulated by the sucking of the calf. Failure to let down milk when milked by hand without the presence of the calf usually leads to complete cessation of milk secretion and consequently to short lactations. It has been found that greater burden of inferior type of cattle is more in case of unfavourable physical environment [7].Thus, demand for additional milk production and draft power have been met by increasing the number of animals rather than the efficiency of existent stock. However, the key to successful animal development programmes lies in reducing the huge number of inferior animals and simultaneously improving breed and availability of feed and fodder [8]. The productive performance of the animal is a key indicator of sustainability of a dairy arming system. However, assessment of productive and reproductive performance depends on composite parameters to assess overall performance evaluation [9]. With increasing income and changing dietary habits the demand for products from animal origin is increasing. To keep pace with the demand, the livestock sector has to gear itself by increasing the productivity because increasing the number of livestock any further has little scope. So in order to meet the demands for livestock products crossbreeding has to play an important role.

Study Area

Gurez valley is located in the Kashmir valley, about 133 Kilometres from Srinagar. The Gurez valley is located between the geographical coordinates of 34º 38´ N latitude to 74º 56´ E longitude in the district of Kupwara. The valley is only accessible through a high altitude pass (Rajdhani pass), which is situated at an altitude between 2460 to 3900 meters above msl.

Objectives

The specific objectives of this study are given below:

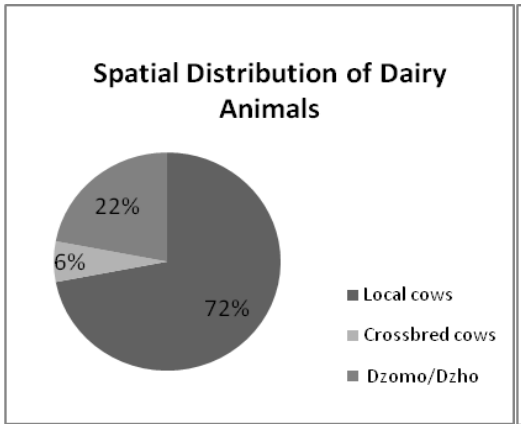
- To study the spatial distribution of livestock in Gurez valley.
- To compare the important productive and reproductive traits of different species of dairy animals in the mountain agro-ecosystem of Gurez valley.

Data Base and Methodology

In this study almost all the information regarding productive and reproductive performance of dairy animals has been collected from the beneficiaries those who maintain these cows in the natural environment and supplement all the feed and fodder which is locally grown. For collecting primary data a questionnaire was specifically designed. A total 122dairy animals were selected from Gurez valley. Data on the productive and reproductive performance of 57 Local cows, 23 Crossbred cows,22 Dzomo and 20 Yaks were collected by questioning the owners about each animal specifically. The dairy animals which had at least two or three lactation periods were chosen for the present study. But usually, most of the rural farmers do not use to keep any written information record on their livestock. For obtaining data most of the information depends on the memory of the respondent for obtaining information. The data were collected through direct response from individual farmers The traits used to measures the biological performance of indigenous and crossbred cows were age at first calving (months), milk yield, (litres /day), lactation length (days), dry period (days), calving interval (days). The collected data has been statistically analyzed with the help of SPSS 16.0 version. In order to ascertain whether the difference in various parameters is significantly different among the breeds, ANOVA was carried out followed by pair wise comparisons (LSD).

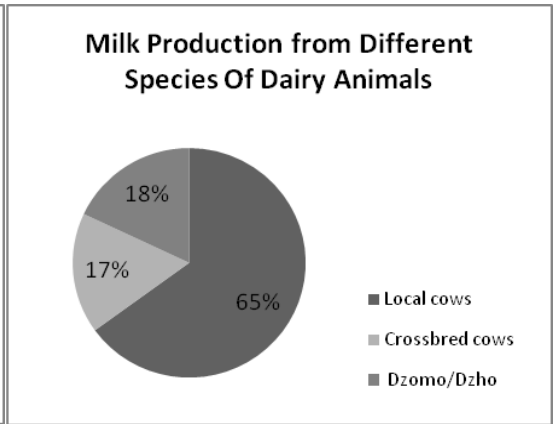
Spatial Distribution of Livestock

The indigenous cattle make 71.91 percent of total cattle population of Gurez valley of Kashmir Himalayas. Mostly dwarf local cattle (Zebu) and Jersey crossbreds were reared for milk and draft purpose. The indigenous cross-breeding of Yak with cattle is an active practice and these crosses are known as Dzomo/Dzho [10]. In Gurez valley 71.91 per cent are local zebu cattle (Bos indicus) 22.16 per cent areDzho/Dzomo and yak and only 5.93 per cent are crossbred cows (Fig. 1.1). Crossbred cows contribute 16.57 per cent, local cattle 65.19 per cent and Yak, ewes and goats 18.24 per cent of milk in Gurez valley (Fig.1.2).



Source: Field Work, 2015

Fig.1.1



Source: Field Work, 2015

Fig.1.2

Local cattle are short structured and live weight ranges from 170 to 210 Kg with an average of 190 Kg.These animals are dark grey in colour with light grey under belly and a dark face. These non- specialized breeds are used commonly as dual-purpose animals, providing milk, meat and drought power. These local breeds also perform well on poor quality roughages and can move on rugged terrain for grazing, whereas the exotic and crossbred heavy milk cattle breeds require quality feed and fodder, and are more vulnerable to diseases and weather extremes [11]. The average milk production of these local cows is 350 to 450 litres per lactation period of 190 to 210 days, whileas that of crossbreds is 1600–1800 litres per lactation of 300- 330 days. It was found that in the study region ninety-five percent of annual grass growth occurs between May and October. Hence, dairy production in Gurez is highly seasonal with 75% of milk supplied between April and September, and 88% of dairy calves are born between February and April. Milk produced is mostly used for domestic consumption and very less quantity was sold as surplus. Very few respondents reported conversion of milk to milk products like Paneer and Ghee. Poor performance and increased mortalities may be attributed to low genetic potential of the local animals, negligible breed improvement programmes, poor winter feeding, and lack of extension services, unhygienic housing and poor health cover facilities.

RESULTS AND DISCUSSION

The reproductive efficiency is a complex phenomenon controlled by both genetic and non-genetic factors, the non- genetic factors being climate, nutrition, and level of management. The reproductive efficiency varies not only between species and breeds but also among the animals within the same breed. Even the best feeding and management cannot coax performance beyond the genetic limit of an inferior animal. Improving the genetic merits of livestock populations is important at all levels of management. A sound breeding programme is a necessary part of the total animal production system. It is absolutely imperative to improve the productive capacity and physical appearance of the animal population.

As indigenous cattle are source of both milk and draught power for agriculture, their replacement by crossbred cattle has been slow. Crossbred males are considered inefficient for drought purposes as compared to indigenous males. The comparative study of the biological aspects of different species of milch animals has been conducted with the objective of understanding the relationship between biological aspects and productivity of different species of animals in Gurez tehsil (Table 1.1).

Table 1.1: Productivity of Dairy Animals in Gurez valley

Parameters	Local Cows N=57 Mean ± SD	Crossbred Cows N= 23 Mean ± SD	Dzo/Dzomo N=22 Mean ± SD	Yak N=20 Mean ± SD	Levels of significance
Age at first calving (Months)	40.11 ± 3.68	35 ± 2.00	45 ±4.55	48.37 ± 5.34	**
Milk yield (liters /day)	2.66±0.45	6.28± 2.29	2.58 ± 0.81	1.90 ± 0.60	**
Post partum heat(days)	143.72±8.23	133.0±12.22	170.12±16.90	198.23±12.24	**
Lactation length (days)	342.54±25.33	338.72±58.88	342±25.52	295.34±28.43	**
Dry period (days)	139.43±8.12	129.12±12.75	167.22±38.77	229.69±29.62	**
Calving interval (days)	489.36± 27.68	438.34±13.55	488.12±41.03	503.03±63.22.	**

Source: Field Work.

** Significant at 1 % level (0.01).

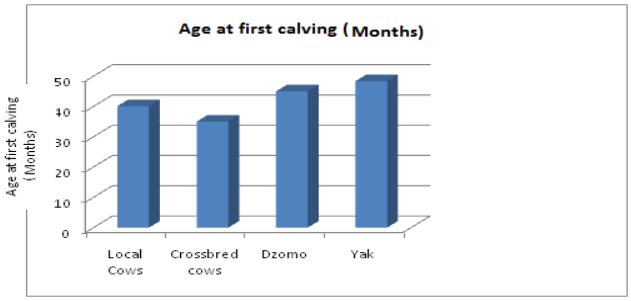
Age at First Calving

Apart from various other factors, delayed first calving in dairy animals makes the milk production uneconomical. Early maturity is considered as a character of great economic importance as from birth to the date of first calving , the animal produces nothing except dung and urine , the value of which is negligible as compared to the cost of maintenance. Generally it has been found that indigenous animals such as local cows, Dzomo and Yak mature at a very late age and the farmers have to bear unproductive investment in rearing these animals for a longer period of time. The average age at calving of various species of dairy animals has been shown in Table 1.1. Among the different genetic groups of dairy animals, the average age at first calving was highest in Yak 48.37 ± 5.34 months, but the lowest was recorded in crossbred cows 35 ± 2.0months. Dzomo which is a crossbreed of Local cow and Yak have the age at first calving as 45 ±4.55 months. The age at first calving of different genetic groups of dairy animals differed significantly ($p<0.01$), while as non -significant difference was found among the Dzomo and Local cows (Table 1.2). Least squares mean for age at first calving in the indigenous cows in the present study was 40.11 ± 3.68 months. These findings were in accordance with the findings of Ahmad, 1989, who reported that age at first calving in local cows was 41.26 ±7.53 but findings of Singh and Raut, [12] were not in accordance with the present findings who reported the age at first calving of the animals as 1787.30 and 1707 days. The mean age at first calving of crossbred cows was found 35 ± 2.00 months which are more are less the same to the findings of [13].

Table 1.2: Age at First Calving
Pair Wise Comparison (The figures are in P values)

Species of Animal	LocalCows	Crossbred cows	Dzo/Dzomo	Yak
Local cows	-	<0.01	0.31	<0.01
Crossbred cows	<0.01	-	<0.01	<0.01
Dzo/Dzomo	0.31	<0.01	-	<0.01
Yak	<0.01	<0.01	<0.01	-

Source: Field Work, 2015



Source: Field Work, 2015

Fig. 1.3

The age at first calving of Yak was found,48.37 ± 5.34 months the findings of [14] also reported similar results. The differences in the age at first calving may be due to variations in breed, the genetic makeup, and deficiency of green fodder during the winters, management practices of the farmers, the harsh climatic conditions of the region, poor heat detection and improper time of insemination and less care towards the heifers. It was also observed that the intensive management practices have helped in reducing the age at first calving. Under traditional system, the heifers received little attention, which may be a cause for late age at first service and delayed first calving.

Milk Yield

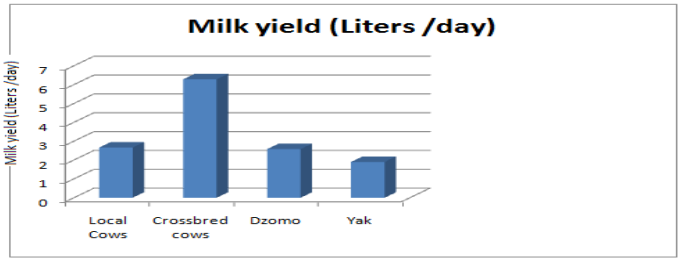
Milk yield of cows of different genotypes from Gurez valley, is presented in Table 1.1.Daily milk average has been considered as an important indicator because it is ultimately milk average that gives a fair return to the farmer. The milk production of indigenous cattle is low as compared to improved breeds of cattle. The overall mean yield of milk from various species of dairy animals was found 2.65 ± 2.23 litres /day. It was found that the average milk yield of crossbredcows was6.28 ± 2.29 litres/day while as, the milk yield of the local cows, Dzomo and Yak was recorded 2.66 ± 0.45, 2.58 ± 0.81 and 1.90 ±0.60 respectively. Statistical analysis showed that there was significant difference ($p <0.01$) within the milk yield of different breeds.

Table 1.3: Milk Yield

Pair wise Comparison (The figures are in P values)

Species of Animal	Local	Crossbred cows	Dzo/ Dzomo	Yak
Local Cows	-	<0.01	0.83	0.10
Crossbred Cows	<0.01	-	<0.01	<0.01
Dzo/Dzomo	0.83	<0.01	-	0.10
Yak	0.10	<0.01	<0.01	-

Source: Field Work, 2015



Source: Field Work, 2015

Fig.1.4

Table 1.3 reveals that significant difference (p<0.01) was found among various breeds of dairy animals and non-significant difference was found among local cows, Dzomo and Yak. The findings of the present study disagree with the results of Kabir, [15], Islam et.al. [16] who found that average milk yield of crossbred dairy cows was 11.09 litres/day. The result indicates that cross bred cows especially Jersey cows is exceptional mainly because their body size is smaller as compared to Holstein Friesian cows and needs less feed. The results of the present study agree with the work [16], who found that the that average milk yield of indigenous cows was 2.28 0.85 litres /day, Miazi et al., [17] and Rahman, [18]. The average milk yield of jersey cows was recorded 5.97 ± 2.29 litres /day. These results are in concurrence with the finding of Miazi et al, [17], who found that milk yield of the Jersey cows were 5. 62 ± 2.16 litres/day.

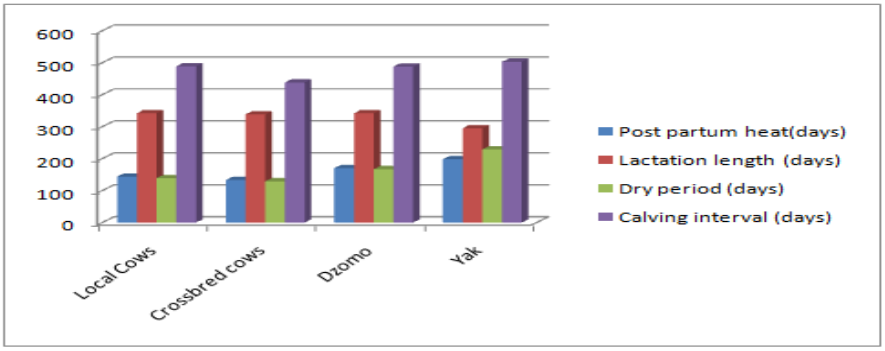
Post partum heat

Post partum heat period were calculated as the interval between parturition to next heat that was observed after a certain period of parturition. Earlier is the post partum period, the shorter will be the calving interval. The length of the postpartum interval is influenced by nutrition, body condition, age, biological efficiency and presence of calf. Post partum heat of dairy animals show that it s differs significantly (p<0.01). The overall mean post partum heat period was recorded 194.31 ± 62.42 days in different dairy animals in the study area. The Table 1.1 reveals that the mean value of post partum heat was recorded lowest in crossbred cows was recorded133.0 ± 12.22 days and the highest was found in Yak 198.23 ± 12.24 days .Variations in the post partum heat might be due to failure to detect heat, insemination by untrained person/poor quality of semen, inappropriate nutrition and harsh climatic conditions. Table 1.4 divulge significant difference in post partum heat in Yak with other breeds of animals (p<0.01). Non- significant difference was found among local cows and crossbred cows.The overall post partum heat of indigenous breeds was found 143 ±8.23days. This result is more or the same as that of Islam et al., 2010, who found post partum heat interval of indigenous cows varies from 2 to 6 months. In this study the post partum heat of Crossbred cows was found 133.0 ± 12.22days, these results are similar with Miazi, [17].

Pair wise Table: 1.4 Post Partum Heat
Comparison (The figures are in P values)

Species of Animal	Local cows	Crossbred Cows	Dzo/Dzomo	Yak
Local cows	_	0.05	<0.01	<0.01
Crossbred cows	0.05	_	<0.01	<0.01
Dzo/ Dzomo	<0.01	<0.01	_	<0.01
Yak	<0.01	<0.01	<0.01	_

Source: Field Work, 2015



Source: Field Work, 2015

Fig.1.5

Calving interval

The calving intervals were recorded on the basis of interval between the dates of one calving to the dates of next calving. This is composed of service period and gestation period or the lactation length and dry period. The mean calving intervals of various genetic groups of dairy cows are shown in Table 1.1.The overall mean calving of different species of dairy animals was found 459.32 ± 76.57 days among various species of animals. The mean calving interval of various species of dairy animals reveals that statistically it differs significantly ($p<0.01$). Among the different species of dairy animals the highest calving interval was found in Yak (503.03 ±63.22 days) and the lowest in Crossbred cows 438.34±13.55days. Calving interval has a significant difference in, jersey with local cows and Yak ($p<0.01$) and non significance difference was found among other breeds.

Pair wise Table: 1.5 Calving Interval

Comparison (The figures are in P values)

Species of Animal	Local cows	Crossbred cows	Dzo/Dzomo	Yak
Local cows	_	0.02	0.02	<0.01
Crossbred cows	0.02	-	<0.01	<0.01
Dzo/Dzomo	0. 02	<0.01	-	0.04
Yak	0.21	<0.01	0.04	-

Source: Field Work, 2015

Dry period

This is the unproductive period of the animal when farmer has to feed and care the dairy animals without deriving any income. Therefore, shorter dry period in milch animals is desirable from an economic point of view. The overall mean dry period was found 117.38 ± 37.88 days in different species of animals. Dry period is the period of rest before calving and gives opportunity to milch animal to get in good condition before subsequent calving. The average dry period was found 139±8.12, ± 129.12±12.75, 167.22 ±38.77, and 229.69±29.62 days in Local cows, Crossbred cows, Dzomo /Dzho and Yak respectively. The mean dry period of various species of dairy animals reveals that statistically it differs significantly ($p<0.01$).Statistical analysis reveals that there was significance difference among Dzomo, Yak and no significance difference in dry period was found in other breeds of dairy animals. These findings coincides with the findings of Ishaq, [19], who reported that dry period of crossbred varies from 90-155 days in crossbreds and local cattle more than 173 days.

Pair wise Table: 1.6 Dry Period

Comparison (The figures are in P values)

Species of Animal	Local Cows	Crossbred cows	Dzomo/Dzo	Yak
Local Cows	-	0.35	<0.01	<0.01
Crossbred cows	0.35	-	<0.01	<0.01
Dzomo	<0.01	<0.01	-	<0.01
Yak	<0.01	<0.01	<0.01	-

Source: Field Work, 2015

Lactation Length

Lactation length affects the total milk production as well as the income from the lactating animals .It has been found that the lactation length of dairy animals was found lowest 295.34 ± 28.43 in case of Yak and highest was found in Local cows 342.54 ± 25.33 . The study reveals that there was statistically significant difference among the different breeds of cattle in lactation length ($p< 0.01$) Table 1.1.The pair wise comparisons revels that there was significant difference among Yak and Dzomo and non – significant difference was found among other breeds of cattle ($P> 0.01$) Table 1.7.The lactation length was higher in Jersey crossbreds followed by Dzomo and the lowest was found in Yak. On the other hand, Ishaq [19], found that lactation length was highest in Fir Holstein Friesian cows 301.52 ±27.32 days. The findings of lactation length of the present study was in accordance of Islam, 1999, who found that average lactation length of Local cows were 330.67 ± 30.68 days.

Pair wise Table: 1.7 Lactation Length Comparison (The figures are in P values)

Species of Animal	Local cows	Crossbred cows	Dzo/Dzomo	Yak
Local cows	_	0.54	0.08	0.67
Crossbred cows	0.54	_	0.27	0.34
Dzomo/Dzo	0.08	0.27	_	0.05
Yak	0.67	0.34	0.05	_

Source: Field Work, 2015

CONCLUSION AND SUGGESTIONS

Dairy farming in Gurez is subsistence and it is an important source of nutrition and income for the poor rural families .It has been found that in this high altitude region of Kashmir Himalayas growth of dairy animals is hindered due to poor management, poor nutrition, lack of good breeds, infertility, reproductive disorders, animal diseases and the poor marketing system for the milk and milk products. These aforementioned problems need to be tactfully resolved to further to attain self-sufficiency and enhance profitability from this sector of the economy. From the results of the comparative study of biological parameters of Crossbred cows, Dzomo/ Dzho, local cows and yak it may be concluded that Jersey crossbreds are most suited for high milk production fallowed by dzomo, indigenous cows and yak. The primary goal of dairy cattle breeding in this region is to increase the efficiency of milk production, and the farmers have considered crossbreeding as an alternative to achieve this goal.It was also found that crossbred cows are more efficient animals in converting feed into milk. All the economical biological parameters lend credence to the fact that crossbreeding programs can be successful only if the exotics and their productive progeny are introduced into optimal nutritional and healthy environments, which will permit their normal rates of development and production. Although milk production of dzomo, yak and local cows is lower than crossbred cows, but the other performance are better especially their small size than the crossbred Jersey cows need less feed and less care .Their disease resistance capacity is very high and needs less management facilities for rearing. By selective breeding of better type of native breeds it will be possible to decrease their unproductive periods.Therfore, training and awareness programmes should be given particularly to the farmers to increase the reproductive and productive performances of the dairy cattle .There is imperative need for stepping up the fodder development and manufacturing of quality compound feed in the region.

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