

IN-MILK BOVINE MILK PRODUCTION PERFORMANCE: A COMPARATIVE STUDY OF BHILWARA DISTRICT AND UDAIPUR DISTRICT

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ABSTRACT: In the districts of Bhilwara and Udaipur, agricultural work and animal husbandry are done in different geographical conditions. Cows and buffaloes are mainly followed for milk business. The area of Udaipur district is more than the district of Bhilwara. The number of rural population and villages is also high. But the bovine numbers are more in Bhilwara district and total milk production is also high here. However, buffalo numbers are almost similar in both districts. After all, what is the reason that bovine density is found more in Bhilwara districts, in the balance of Udaipur districts! This comparative study has to be concluded that how bovine numbers are related to availability of fodders and land use pattern! While the annual average rainfall and education rates of Bhilwara districts remain the same. Apart from this, the effect of agricultural work on milk production of both districts is being studied. It was also studied that how Bovine breeds found in Bhilwara district are related to much milk production.

Keywords: Milk Production Performance, In-milk Bovine, Milk Yield, Milk Production Density, Bovine Population Density.

1. INTRODUCTION

1.1 Introduction to Rajasthan

Rajasthan is India's largest state with geographical area of 342,239 square kilometers. The state's population is 56 million and density is 165 people per square kilometer. Rajasthan has traditionally been an agricultural state. 60 percent of the area has been desert and 01 percent is the only water surface level of county. Along with this, there has been problem of short rainfall and drought. In such a situation, The importance of animal husbandry increases. By failure of rainfall, animal husbandry is less affected than agriculture. Bovine are the most important sources of livelihood in the state, especially for the poor. Rajasthan is a leading

milk producer. Gir, Tharparkar, Sahiwal and Rathi are the best indigenous breeds. The state ranks second in terms of buffalo population in India and fifth in cattle population. According to the 19th livestock census of 2012, the cattle population was 13,324,462 and the number of buffaloes was 12,976,095 in 2012. It is the 2nd largest milk producer in the country and produced around 16934 thousand tons in 2014-15. Companies like Saras, Amul, Lotus, Payas, Mother Dairy etc are working for milk business in the state. Apart from this, milk business is also done at the local level.

In Rajasthan, Rajasthan Cooperative Dairy Federation Limited was established in 1977 as a society under the Rajasthan cooperative societies act 1965. Presently, there are 14222 Dairy Co-operative societies affiliated to the RCDF and its membership of milk producers are 785032 (as on may 2017). Dairy farming has emerged as a major employment medium due to the Dairy Co-operative Movement in Rajasthan.

1.2 Overview: Bhilwara District and Udaipur District

Bhilwara and Udaipur districts are located in the southern region of the state. Bhilwara district is spread over 10,455 square kilometers. According to census 2011 the population here is 2408,523. The district is mainly textile and mineral industry, hence it is also known as Manchester of India. According to the 19th Livestock of 2012, the number of total animal in the Bhilwara district spread over an area of 10455 sq km was 2445292 and 234 animals in the area per square kilometer of the district. Here the literacy rate is 62.71 percent, the Bovine population (2013-14) was 487,000, forest area was 76,000 hectares and annual average rainfall was 748 mm. Bhilwara has moderate climate with dry summer and extreme winter. Average rainfall is 80 cm. Banas, Berach, Kothari and Khari are the principal rivers. Major crops are wheat, maize, rapeseed and mustard, jowar, pulses, groundnut, barley, sesamum, sugarcane, cotton, red chilies, gram, and bajra. Bhilwara District Milk Producers Cooperative Union works in Bhilwara district. Bhilwara Milk Union is an **ISO 9001:2008 & IS 15000 (HACCP)** certified organization. This Milk Union is affiliated to Rajasthan Co-operative Dairy Federation Limited.

Area of Udaipur district was 13419 sq km and the animal population was 2780,566. There were 207 animals in the area per square kilometer of this district. Udaipur district is spread over an area of 13430 sq km, which is bigger than Bhilwara district. According to census 2011 the population here is 3068,420. Udaipur is known as the city of lakes. The literacy rate here is 62.74 percent, similar to Bhilwara district. In 2013-14, forest area was 397137 ha, bovine population (2013-14) was 430,000 and average annual rainfall was 737 mm in the district. The district is also rich in mineral wealth. Important metallic and non-metallic minerals are found in the district. Udaipur Milk Producer Cooperative Union Limited offers services in Udaipur and Rajsamand districts of South Rajasthan. Udaipur Dairy was established in 1972. Udaipur Milk Union registered under Rajasthan Co-operative Societies Act 1965.

1.3 Bovine Status of Bhilwara and Udaipur District

In 2010-11, in-milk bovine populations were 279 thousand in Bhilwara district and 336 thousand in Udaipur district. This year, milk production was 419000 MT in Bhilwara district and 423,000 MT in Udaipur district. In 2013-14, the in-milk bovine populations were 284 thousand in Bhilwara district and 221 thousand in Udaipur district. This year, milk production in Bhilwara district was 433,000 MT and Udaipur district's milk production was 371,000 MT. Bovine includes cow and buffalo descent.

Table 1: In-Milk Bovine Population (in thousand)

Years	Indigenous Cattle		Crossbred Cattle		Buffalo	
	Bhilwara	Udaipur	Bhilwara	Udaipur	Bhilwara	Udaipur
2010-11	144	157	39.53	26.33	96	153
2011-12	143	80	24.42	6.64	122	105
2012-13	145	105	25.94	7.48	114	109
2013-14	151	92	25.94	8.34	111	117

TABLE 2: Bovine Milk Production (MT)

Years	Indigenous Cattle		Crossbred Cattle		Buffalo	
	Bhilwara	Udaipur	Bhilwara	Udaipur	Bhilwara	Udaipur
2010-11	174000	130000	96000	61000	149000	232000
2011-12	161000	90000	64000	16000	210000	223000
2012-13	167000	117000	68000	18000	200000	232000
2013-14	176000	101000	68000	20000	189000	250000

2. REVIEW OF LITERATURE

Various literatures based on the subject of milk production and dairy sector has been read, which are related to the objectives of this study. The study of these literatures has inspired me to do research in this direction. Some of these references are being given below:-

A study by **Vishnoi Sushila, Pramendra, Gupta Vijay and Pooniya Raju (2015)** under the title "Milk production function and resource use efficiency in Jaipur district of Rajasthan" and concluded that the green fodder, dry fodder, labour and miscellaneous expenditure were found to be statistically significant in case of small category of commercial dairy farm, green fodder, dry fodder and miscellaneous expenditure in case of medium, green fodder, concentrate, labour and miscellaneous in case of large and concentrate and labour in case of overall herd size category.

Kumawat Raju, Singh NK & Meena Chiranjee Lal (2014) concluded that there was Holstein Friesian cow produced more quantity of milk than was produced by local cows. In general, Holstein Friesian cows maintained about 45 per cent of the total milch animals and 30 per cent Jersey cows. They suggested that 'there is need to motivate dairy owners for adoption of scientific management practices in rearing of milch animals for better health and performance'.

Waris Amtul (2014) has done a study on agricultural knowledge management and suggested that the dairy members being a part of the collective action could therefore be harnessed for agriculture knowledge management, identify key communicators to serve as knowledge brokers and use social network to spread information.

Meena GL and Jain DK (2012) conducted a comparative study on milk production and suggested that buffalo milk production is relatively more profitable than cow. The study in nutshell indicated a positive impact of dairy cooperatives on several economic parameters such as average cost and return, production, consumption and marketed surplus of milk in dairy enterprise as evidenced from the results of the investigation. Per day net maintenance cost was found to be higher for member group than that of non-member group. It was found to be higher in case of buffalo than that of cow and also observed more in the summer season. Per litre cost of buffalo and cow milk production was observed to be higher for the non-member as compared to member group. Overall average daily milk production, consumption and marketed surplus of milk were found higher on the member group as compared to non-member group.

Shahi Sudhir Kumar, Singh Rajvir, Mishra U.K. and Mishra D.J. (2012) analyzed that in the Indian economy the dairy sector will have a big role in future. It is emerging as a new area in employment generation.

Sarker Debnarayan and Ghosh Bikash Kumar (2008) conducted studies on cooperative and non-cooperative and concluded that Out of total variable cost for all categories of cooperative and non-cooperative dairy farms, feed cost is the major cost component in which CF occupies the highest contribution. Similarly, out of fixed cost component, interest on capital has the major contribution for all types of farms.

3. RESEARCH METHODOLOGY

- **Type of Research:** This is a descriptive and comparative study. Comparative study of milk production performance of two districts has been done. This study has made many facts of both the districts clear.
- **Collection of Data:** These comparative studies are based on secondary data. Data collected from various sources, published as well as unpublished research papers, government reports, magazines, census, journals, books, and websites.
- **Period of Study:** Studies have been conducted with the data from 2010-11 to 2013-14.
- **Tool of Analysis:** The data of two districts was concluded from the proportional and comparative method. Data was also analyzed by creating tables of bovine milk yield and density of districts as well.
- **Limitation of the Study:** Data of this comparative and descriptive study based on secondary data has been taken from Government Reports, Milk Union's website, journals, articles and research papers. Comparative study of data has been done through table and percentage. Milk production performance of both districts has been analyzed primarily

through bovine milk yield and density. Bovine breed and land use patterns have also been studied. Bovine includes cow and buffalo descent.

Objectives of the study

- To find out the successful district by analyzing the milk production performance of the districts.
- To find out the effect on the availability of fodder bovine populations.
- To know the District of Environment according to Animal Husbandry through Analysis of Milk Production Performance.
- To clarify the effects of good breeds of bovine on milk production.

Hypothesis

- **H1:** Bovine breeds have a positive effect on Milk Yield.
- **H2:** Availability of fodder has a positive impact on bovine density.

4. DATA ANALYSIS AND INTERPRETATION

4.1 Milk Yield: Production Performance

In Bhilwara district, in-milk cattle population in the year 2013-14 was 176940 and the milk production was 244000 MT. Therefore, in-milk cattle yield was 3.78 kg of milk per day.

We divided the cattle into two breeds, namely the indigenous cattle and crossbred cattle. Which had 151,000 in-milk indigenous cattle population in this year and 176,000 MT of milk was produced. So, in-milk indigenous cattle milk yield was 3.192 kg of milk per day.

In same year, Bhilwara district had 25940 in-milk crossbred cattle population and 68000 MT milk was produced. Average per day per crossbred cattle (milk yield) gave 7.203 kg of milk.

When analyzing the buffalo dynasty of Bhilwara district, it was revealed that there was 111000 in-milk buffalo population in the district and 189000 MT milk was produced. Buffalo Milk Yield was 4.665 kg per day.

Table 3: Bovine Milk Yield (Kg/Day)

Years	Indigenous Cattle		Crossbred Cattle		Buffalo	
	Bhilwara	Udaipur	Bhilwara	Udaipur	Bhilwara	Udaipur
2010-11	3.293	2.274	6.647	6.321	4.256	4.146
2011-12	3.098	3.060	7.116	6.731	4.714	5.841
2012-13	3.159	3.046	7.131	6.533	4.811	5.838
2013-14	3.192	2.993	7.203	6.533	4.665	5.850

If the Bovine profile of Udaipur district is seen, then it is noticed that the in-milk cattle population in the year 2013-14 was 100340 and the cattle milk production was 121,000 MT. Therefore, cattle Milk Yield was 3.30 kg per day. If cattle are split into indigenous and

crossbred, in-milk indigenous cattle was 92000 and milk production was 101,000 MT. Therefore, milk yield of Indigenous cattle was 2.993 kg per day. Population of crossbred cattle is very low. In the district 8340 crossbred cattle and milk production was 20000 MT. Crossbred cattle Milk Yield was 6.553 kg per day. In-milk buffalo population descent is more in Udaipur district. In 2013-14, there were 117,000 buffaloes and milk production was 250000 MT. Average per buffalo milk production was 5.850 kg per day.

In 2013-14, in-milk bovine population of Bhilwara district was 288,000 and milk production was 433,000 MT. Bovine Milk Yield was 4.122 kg per day. While in Udaipur district 218,000 in-milk bovine population and milk production was 371,000 MT. In this way the Bovine Milk Yield was 4.666 kg per day.

4.2 Density: Population and Milk Production

To study about in-milk bovine population density and milk production density, the data of indigenous cattle, crossbred cattle and buffalo was studied separately.

In Population Density, the density of in-milk indigenous cattle in Bhilwara district was 14.44 in 2013-14, whereas in Udaipur districts this density was less than half the 6.86. Population density of crossbred cattle has been very much in Bhilwara compared to Udaipur. Population density of Crossbred cattle in 2013-14 was 2.48 in the district of Bhilwara, whereas only 0.62 in Udaipur. Population density of buffaloes has been high in Udaipur in 2010-11 but in later years it has been more in Bhilwar, in 2013-14, 10.62 in Bhilwara and 8.72 in Udaipur. .

Table 4: In-milk Bovine Population Density (No per sq km)

Years	Indigenous Cattle		Crossbred Cattle		Buffalo	
	Bhilwara	Udaipur	Bhilwara	Udaipur	Bhilwara	Udaipur
2010-11	13.77	11.70	3.78	1.96	9.18	11.40
2011-12	13.68	5.96	2.34	0.49	11.7	7.82
2012-13	13.87	7.82	2.48	0.56	10.90	8.12
2013-14	14.44	6.86	2.48	0.62	10.62	8.72

Milk production density of indigenous cattle and crossbred cattle in Bhilwara district has been high in these four years. In 2013-14, the milk production density of indegenous cattle was 46.12 in Bhilwara district, in Udaipur district it was 20.26 only. In 2013-14, milk production density of crossbred cattle in Bhilwara district was 17.82, in Udaipur it was 4.08 only. Milk production density of buffaloes has been higher in Udaipur district in 2010-11, which was 47.36, while in Bhilwara district it was 39.04. In later years it has been more in Bhilwara. In 2013-14, milk production density of buffaloes was 49.53 of Bhilwara districts, while in Udaipur district it was 51.04.

Table 5: Bovine Milk Production Density (kg/day/sq km)

Years	Indigenous Cattle		Crossbred Cattle		Buffalo	
	Bhilwara	Udaipur	Bhilwara	Udaipur	Bhilwara	Udaipur
2010-11	45.596	26.541	25.156	12.454	39.045	47.367
2011-12	42.189	18.375	16.771	3.266	55.030	45.529
2012-13	43.762	23.887	17.819	3.675	52.409	47.367
2013-14	46.120	20.621	17.819	4.083	49.527	51.042

4.3 Profile of Cattle and Buffalo Breeds

In Rajasthan there is a lot of breed of cattle & buffalo. Mainly in cattle, Gir in Ajmer and Bhilwara, Tharparkar in Jaisalmer, Barmer and Jodhpur, Hariyanvi in Sikar, Jhunjhunu, Jaipur and Ganganagar, Kankarej in Badmer, Jalore and Jodhpur and Rathi breed in Bikaner and Adjoining Areas are found. Murrah and Surti are the main buffalo breeds in the state.

In Bhilwara there are mainly Gir species in the indigenous cattle breed, whereas jersey and Holestein Friesian are found in Crossbred. The number of non-descript buffaloes is very much in Bhilwara. But if the dynasty is seen then Murrah buffalo is more.

In Udaipur district, Malvi is found mainly in Indigenous Cattle species and jerseys are found in crossbred cattle species. In Udaipur district there are mainly buffaloes of Surti dynasty. While there are number of murrah buffaloes on the second number which is more than Bhilwara.

4.4 Feed Resources Availability and Land Use Pattern

In both the districts, the availability of fodder, average annual rainfall and land use are analyzed and in view of the animal feed, the conditions of the district of Bhilwara are more suitable. Average annual rainfall is almost the same in the districts, in 2013, the average annual rainfall in Udaipur was much higher than in 2014 there was more in Bhilwara. Though the area of Udaipur districts is high, but on the study it becomes clear that due to the Aravali area in the districts, forest land is very high and Net Son Area is very low. In 2013-14, forest area in Udaipur was 397,000 hectares, whereas in Bhilwara it was only 76,000 hectares. Net Son Area Bhilwara had 429,000 in 2013-14, while in Udaipur it was only 239,000 hectares. If the study of land use pattern related to animal feed, In 2013-14, Permanent Pasture and Grading Lending in Bhilwara district were 121,000 hectares, whereas 83,000 hectares of land was available for it in Udaipur. In Bhilwara district this year, the area under fodder crops was 54,000 hectares, while in Udaipur district the land was 22,000 hectares.

Table 6: Feed Resources Availability and Land Use Pattern

District	Avg. Rainfall 2013 & 2014 (mm)	Net sown area (ha) (2013-14)	Permanent Pastures & Grazing Land (ha) (2013-14)	Forest Area (ha) (2013-14)	Fodder Crops Under area (ha) (2013-14)
Bhilwara	690 & 748	429,000	121,000	76,000	54,000
Udaipur	746 & 737	239,000	83,000	397,000	22,000

5. CONCLUSION

Comparisons of milk production performance between Bhilwara and Udaipur districts, the following findings should come out:

1. In 2010-11, the number of in-milk cattle was almost equal in Bhilwara and Udaipur Districts. Whereas the number of in-milk buffaloes was higher in Udaipur district.
2. In 2011-12, the in-milk cattle number of Udaipur district has a significant reduction of about 52 percent. While the number of in-milk buffaloes also decreased by 31 percent.
3. Buffalo's milk production has been higher in Udaipur district whereas in 2011-12 and 2012-13 the number of in-milk buffaloes was more in Bhilwara district.
4. After 2010-11, the number of cattle in Bhilwara district has been high. And milk production from cattle is also high.
5. Cattle Milk Yield- Cattle of Bhilwara district give more milk ie that cattle milk yield is high. Because in Bhilwara, there are more cattle of the Gir breed, which give more milk than the cattle of Malvi breed found mainly in Udaipur.
6. Buffalo Milk Yield- Buffalo milk yield in Udaipur is high. Because the number of Murrah and Surti breed giving more milk is more in Udaipur district compared to the district of Bhilwara.
7. In Bhilwara district, the population density of Indigenous Cattle and Crossbred Cattle is high, with both types of cattle breed's Milk Production Density also high.
8. Since the year 2011-12, the buffaloes Population Density and Milk Production Density are high in Udaipur district. While in 2010-11, both of them were more in Bhilwara district.
9. Land for net sown area, permanent pastures & grazing and fodder crops is more available in Bhilwara district.

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