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An Explorative Study on the Development of Organic Farming Model

[1]S.K. Das, [2]S.K. Singh, [2]B.P.S. Yadav and [2]M.A. Khan
[1]ICAR Research Complex for Goa, Ela, 403402 Old Goa, Goa, India
[2]ICAR Research Complex for Eastern Region, 800014 Patna, Bihar, India

Abstract: The 2 crossbred low yielding milch cows were maintained in loose housing under the organic farming project and their performances were studied in the system. About 1 ha of land was brought under organic farming. About 50% land was earmarked for crop, i.e., paddy, wheat in different season, 20% land for fishery, 20% land for horticultural crop and 10% land was kept for dairy and fodder production. Overall mean yield of morning milk, evening milk and total milk per cow was found to be 3.966, 2.936 and 6.902 kg, respectively. Average daily intake of dry roughage, green roughage and concentrate per cow was 4.504, 7.134 and 6.371 kg, respectively. Average daily yield of dung was 12.891 kg. Highest total milk yield of cow (10.450 kg) was recorded in the month April. Higher milk yield during the month April was due to availability green fodder. Multiple Regression analysis of data indicated that daily milk yield of cow increases by 339 and 811 g ($p<0.01$) per kg increase of green roughage intake and concentrate intake.

Key words: Organic farming, crossbred cows, milk production, wheat, fishery

INTRODUCTION

Organic farming is a concept based on sustainability of agro-ecological systems. In India organic farming is mainly based on traditional mixed farming with integration of crop, horticulture, livestock and fishery. Organic farming has gained impetus both in India and worldwide, in view of increased environmental awareness, consumer preferences, as well as sustainability of farm resources. Organic products both animal and crops are increasingly attractive to farmers with high lucrative values and sales, thus organic agriculture production and trade is rapidly expanding world over. In India, the state of Uttarakhand is the first state declared as organic by Government of India. Though, animals are an essential component of organic farming, much has not been done to orient organic farmers towards organic livestock farming, unlike in crop sector where farmers are getting premium prices for organic food products. It is fact that organic farming is the age old practice in India but organic farmers are not certified methodically. In response to the $26 billion global market for organic foods, the Government of India set up a National Institute of Organic Farming in October, 2003 in Ghaziabad, Madhya Pradesh. The purpose of this institute is to formulate rules, regulations and certification of organic farm products in conformity with international standards. It was reported that Global turnover of organic food was 46 billion US dollar in 2007 and it will attain a turnover of 50 billion US dollar very soon (Sahinli, 2013). Actual development and progress of the organic farming depends on the interest of the consumers for organic products. So, considering the importance of organic farming in India in near future an effort was taken to initiate for the development of organic farming model incorporating crop, livestock and fishery components at Patna, Bihar located at lower gangetic plane region of India.

MATERIALS AND METHODS

About 1 ha of land was brought under organic farming at institute farm located at Patna of Bihar. About 50% land was earmarked for crop, i.e., paddy, wheat in different season, 20% land for fishery, 20% land for horticultural crop and 10% land was kept for dairy and fodder production. The crossbred (Holstein Friesian× Indigenous local) low yielding milch cows were maintained in loose housing system and management as per standard of organic farming. A low cost open type cowshed having dimension 6×4 m was constructed with low cost materials, such as bamboo, paddy straw with earthen floor. As per norm of organic livestock farming more floor space, i.e., 12 m^2 per cow was provided. They were fed with the feed and fodders produced in the system mostly. As per norm of organic livestock farming 60% dry matter of cow should be forage based, i.e., cows should be provided 60% green roughage. Therefore, Barseem, Oat, Mustard in Rabi season, Maize, Cowpea in Summer, Jowar and Napier in Kharif season were produced organically for maintenance and production of

Corresponding Author: S.K. Das, ICAR Research Complex for Goa, Ela, 403402 Old Goa, Goa, India

2 cows. Paddy straw was available from the system itself. Rice polish, wheat bran, pulse chuni available in the system along with common salt were used for preparing concentrate mixture. Cow dung received from the cows was used to fertilize the land for producing cereal crops and fodder crops besides putting in the pond for fish production. Restricted grazing on natural pasture was practiced for 3 h daily. Manual milking was practiced twice daily, i.e., morning at 8:00 a.m. and evening at 4:00 p.m. Artificial insemination was practiced by liquid semen. Use of veterinary medicine was kept as low as possible. Treatment was done usually by herbal medicine. Except very emergency case no antibiotic, vitamin and mineral were used for cows. Regular data were recorded on feed and fodder intake, milk yield of cow, meteorological parameters, etc. Feed and fodder were analyzed as per AOAC (1980). Daily meteorological parameters were recorded as per standard method (IMD, 1991). Data were analyzed as per Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

The 2 crossbred (Holstein Friesian×Indigenous local) low yielding milch cows were maintained in loose housing system and their performances were shown in Table 1. It was found that average daily morning milk yield, evening milk yield and total milk yield was significantly ($p<0.05$) higher in cow No. 25 than that of cow No. 29. Even lactation length (days) and total lactation yield (kg) in cow No. 25 were significantly higher than that of cow No. 29. But, peak yield of cow No. 29 was higher than that of cow No. 25. Average daily intake of dry roughage and concentrate was also significantly ($p<0.05$) higher in cow No. 25 than that of cow No. 29. Overall mean yield of morning milk, evening milk and total milk per cow was found to be 3.966, 2.936 and 6.902 kg, respectively. Recording of morning milk yield was always found to be higher than that of evening milk yield in both the cows. Average daily intake of dry roughage, green roughage and concentrate per cow was 4.504, 7.134 and 6.371 kg, respectively. Average daily yield of dung was 12.891 kg. The low yield of milk was associated with the limitation in the availability of organically produced cake ie GNC or MOC, protein supplement present in concentrate ration which is generally used in formulation of concentrate ration in traditional dairy/commercialized dairy. Other reasons might be high ambient temperature, as well as poor genetic make up as the cows were crossbred of Holstein Friesian and local. Sundrum (2001), Hovi *et al.* (2003) and Roesch *et al.* (2005), reported that cows produced lesser milk in organic farming than that produced in integrated farming due to restricted feeding in concentrate. Lund and Algers (2003), also reported 16% lower milk production in organic herd than the conventional production system. Body weight during lactation is associated with the daily milk yield and lactation yield of the cows. It means higher the body weight during lactation higher is the milk yield. In the present study, cows were of low to medium live weight which was another contributory factor for low yield of cows maintained organically. This finding was supported by Roesch *et al.* (2005).

Month wise analysis of data revealed that there was highly significant ($p<0.01$) difference of morning milk yield, evening milk yield, total milk yield, dry roughage intake, green roughage intake and concentrate intake between the months. Highest morning milk (5.862 kg) was recorded in the month February whereas highest evening milk (5.033 kg) and highest total milk (10.450 kg) were recorded in the month April. Higher milk yield during the month of April was due to availability of green fodder. Multiple regression analysis of data indicated that daily milk yield of cow increases by 339 and 811 g ($p<0.01$) per kg increase of green roughage intake and concentrate intake.

The proximate composition of fodder was delineated in Table 2. It was observed that barseem contained highest amount of protein, NFE and total ash, i.e., mineral whereas mustard contained highest (%) of dry matter and EE, i.e., crude fat and hybrid napier contained highest amount of crude fiber.

It is assumed that health condition of cows may be hampered in organic farming due to poor level of nutrition. As a consequence genetic make up of organic cows is to be taken into consideration. So, it is better to rear high yielding indigenous cows. However in this study, no major health problem was recorded. Similarly, Sundrum (2001) reported that no major differences in health aspect of cows in general had been identified between organic and conventional farming. In the present study, few incidences of parasitic diarrhoea problem occurred which

Table 1: Performance of cow under the system

Cow No.	Av. daily morning milk yield (kg)	Av. daily evening milk yield (kg)	Av. daily total milk yield (kg)	Av. daily intake of dry fodder (kg)	Av. daily intake of green fodder (kg)	Av. daily intake of concentrate (kg)
25	4.200^{a}±0.050 (334)	3.132^{a}±0.062 (334)	7.332^{a}± 0.106 (334)	4.581^{a}±0.042 (334)	7.225^{a}±0.235 (334)	6.499^{a}±0.078 (334)
29	3.732^{b}±0.151 (334)	2.740^{b}±0.122 (334)	6.472^{b}±0.267 (334)	4.427^{b}±0.054 (334)	7.044^{a}±0.215 (334)	6.243^{b}±0.095 (334)
Overall	3.966±0.081 (668)	2.936±0.067 (668)	6.902±0.144 (668)	4.504±0.032 (668)	7.134±0.224 (668)	6.371±0.059 (668)
F-value	8.335**	8.416**	9.081**	5.600*	0.162 NS	4.635*

*, **p<0.05, 0.01, respectively; Figures having different superscripts in a column differ significantly ($p<0.05$)

Table 2: Proximate composition of different feed and fodder on DM basis

Name of fodder crop	Percentage					
	DM	CP	CF	EE	NFE	TA
Barseem	28.25	17.26	21.92	4.80	52.15	3.87
Oat	31.08	15.81	26.18	4.25	50.26	3.50
Mustard	34.55	10.34	38.17	5.67	43.07	2.75
Cowpea	24.29	16.97	24.87	3.95	50.60	3.61
Jowar	30.47	11.24	40.18	2.87	43.23	2.48
Hybrid napier	33.27	10.57	43.17	2.50	41.04	2.72
Maize	26.11	9.88	42.72	3.57	41.75	2.08

was controlled by herbal anathelmentic. Parasitism was also controlled by judicious livestock management of alternate grazing with other species, i.e., goat. Helminth infection is very common in organic farming as informed by Younie and Hermansen (2000). It might be due to grazing and rearing of animal mostly on green roughage. One incidence of mastitis occurred during the period of study which was cured by treatment. Busato *et al*. (2000) and Hovi *et al*. (2003) indicated prevalence of mastitis in organic farming and it was also reported that lower milk yield of cows in organic farming was associated with the occurrence of mastitis. Reproductive performances of the cows were good in respect of occurrence of heat, age of conception, service per conception, calving interval, etc. Lund and Algers (2003) reported that they have not found any severe problems in organic dairy herd except clinical mastitis. Alternative treatment was practiced to treat mastitis. Except in severe case no antibiotic was used. However Cabaret (2003), reported that reproductive efficiency of organically managed dairy cows was found to be lower than that of cows raised on conventional management condition.

Average value of air temperature and average value of relative humidity were 29.35±0.28°C and 71.69±1.03%, respectively during the period of study. Peak maximum temperature (43.82°C) was recorded in the month May and lowest minimum temperature was recorded in the January (10.75°C).

CONCLUSION

So, it can be inferred that organic farming is a challenge for farmers, livestock researchers, planers as per standard norm of organic farming. However, it needs lot of research, strategic management, proper planning, implementation and monitoring to get maximum benefit from the organic farming suitable to Indian condition.

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