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Production Performance, Feed Efficiency and their Correlation in Lactating Kankrej Cows at Organized Farm

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Abstract

A study was conducted to assess production performance, feed efficiency and their correlation in lactating Kankrej cows at organized farm. The variables such as average dry matter intake, milk yield, milk composition and feed efficiency were evaluated in 49 lactating Kankrej cows over a period of 30 days. The mean dry matter intake was 9.71±0.08 kg/d. The average milk yield and energy corrected milk were 12.45±0.35 kg/d and 14.27±0.47 kg/d, respectively. Feed efficiency was 1.48±0.05 in Kankrej cows, and it was significantly affected by average milk yield and energy corrected milk. The average milk yield and energy corrected milk were highly correlated with feed efficiency. Pearson's square correlation coefficient was 0.96 between feed efficiency and energy corrected milk.

Introduction

The productive potential of livestock mainly depends upon feeding of balanced ration and economic returns are determined by productivity and feed efficiency. Feed efficiency is a simple measure to determine the relative ability of cows to turn feed nutrients into milk and/or milk components. The monitoring of feed efficiency has become not only an economic marker in dairy farming, but also an excellent environmental marker (Hutjens, 2010). Moreover, feed efficiency is receiving more attention as feed costs increased. Feed efficiency is highly variable among dairy cows and this variation can have a significant impact on economic performance (Linn *et al*., 2009). Feed efficiency in dairy cattle is known to be affected by a variety of factors, including host genetics, environmental conditions such as ambient temperature, the varying metabolic contributions and demands of pregnancy, tissue mobilization, and immune response (Jewell *et al.,* 2015). Feed efficiency also has implications for environmental concerns. It is also influenced by days in milk of cow, because cows in early lactation will be losing body weight and using that energy for milk

production. A high feed efficiency (> 2.0) in early lactation can actually indicate a problem that cows are losing too much weight, possibly leading to metabolic disorders.

Kankrej is one of the dual purposes indigenous breed of India having home-track in Kankrej taluka of Gujarat state, which is good for milk production and bullock are very powerful/ strong and suitable for draft purpose. During year 2017 average lactation milk yield of Kankrej cow was 2523.33 litres in 305 days at organized farm of Livestock Research Station, SDAU, Sardarkrushinagar, Gujarat (Anonymous, 2018). However, information about feed efficiency in lactating Kankrej cow is not available to this date. Moreover, it is important to know the correlation between feed efficiency and milk yield for better production performance. Therefore, this study was conducted with the aim to assess production performance, feed efficiency and their correlation in lactating Kankrej cows at organized farm.

Materials and Methods

The experiment was carried out at Livestock Research Station, SDAU, Sardarkrushinagar, Gujarat. It is located in semi arid region of Banaskantha District of North Gujarat having latitude of 24.35º north and longitude of 72.59º east and at an elevation of 189 meters above the mean sea level. Forty nine lactating Kankrej cows (21 days in milk) were included in this experiment for a period of 30 days. The animals were fed as per ICAR (2013) feeding standards to meet the nutrient requirements. Cows were fed with fixed quantity of concentrate pellets and cotton seed cake along with measured amounts of green (maize fodder) and dry (jowar hay) fodder. Residual feed if any was recorded daily. All the experimental animals were reared under standard management practices with free access to fresh and clean drinking water. The feeds and fodder used in the experiment were analyzed for chemical composition, *viz.,* dry matter, crude protein, crude fibre, ether extract and total ash (AOAC, 2007).

All cows were milked twice a day (morning 4:00 a.m. and evening 4:00 p.m.) and individual milk yield of each cow was recorded daily by using electronic weighing balance. For analysis of milk constituents, milk samples were collected at weekly interval. Milk fat, solid not fat (SNF), protein and lactose were determined by using EKOMILK Ultra Pro Milk Analyzer (Everest Instruments Pvt. Ltd.). The energy corrected milk (ECM) yield was calculated as:

ECM = 0.327 x Milk Yield (kg) + 12.95 x Fat Yield (kg) + 7.20 x Protein Yield (kg)

Feed efficiency was calculated as: **FE** = ECM / Dry matter intake (kg)

The data obtained was statistically analyzed as per the method of Snedecor and Cochran (1994). Descriptive statistics used was for dry matter intake, average milk yield, milk composition, ECM and feed efficiency. Pearson's square correlation coefficients of feed efficiency were used to measure the intensity of the linear relationship between the feed efficiency and the other variables.

Results and Discussion

Descriptive statistics and Pearson's square correlation coefficients for the analyzed variables in lactating Kankrej cows are presented in Table 1. The overall mean dry matter intake was 9.71±0.08 kg/d, which was in line with report of Raval *et al.* (2013) in lactating Kankrej cows (10.03±0.04 kg/d). The average milk yield and energy corrected milk were 12.45±0.35 and 14.27±0.47 kg/d, respectively. Feed efficiency was 1.48±0.05 in Kankrej cows. Vallimont *et al.* (2011) and Arndt *et al.* (2015) reported feed conversion efficiency of 1.03 and 0.98, respectively, in commercial dairy farms. Raval *et al.* (2013) reported feed efficiency of 1.20±0.07 in lactating Kankrej cows. As all the cows were in peak lactation, we found better milk yield and feed efficiency in Kankrej cows. Moreover, high yielding animals are more energetically efficient, since the most part of the ingested energy is diverted to the mammary gland for production of milk in relation to maintenance (Linn *et al.,* 2007). The average fat content in Kankrej cow milk was 4.08±0.09%.

The dry matter intake had a negative correlation with feed efficiency (Table 1) indicating that increase in this variable inversely affect feed efficiency. The feed efficiency in lactating Kankrej cows was significantly ($p<0.01$) affected by average milk yield and energy corrected milk.

Table 1: Descriptive statistics and Pearson's square correlation coefficients for the analyzed variables in lactating Kankrej cows (n=49)

Descriptive statistics	
Variables	**Mean±SE**
Body weight (kg)	421.10±5.81
Dry matter intake (kg/d)	9.71±0.08
Average milk yield (kg/d)	12.45±0.35
Energy corrected milk (kg/d)	14.27±0.47
Feed efficiency	1.48±0.05
Milk fat (%)	4.08±0.09
Milk SNF (%)	8.24±0.08
Milk lactose (%)	4.39±0.04
Milk protein (%)	3.34±0.03
Pearson's square correlation coefficients with feed efficiency	
Dry matter intake (kg/d)	-0.005^{NS}
Average milk yield (kg/d)	0.88^{**}
Energy corrected milk (kg/d)	0.96^{**}

**p<0.01; NS: Non-significant.

The average milk yield and energy corrected milk yield were highly significantly correlated with feed efficiency (r= 0.88 and 0.96).

Conclusion

Production performance in terms of milk yield, milk composition and feed efficiency in lactating Kankrej cows was found to be better at an organized farm. Milk yield and energy corrected milk were positively correlated and significantly influenced the feed efficiency; however, dry matter intake had a negligible correlation with feed efficiency.

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Conflict of Interest:

All authors declare that they have no conflict of interest.

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