International Journal of Agriculture Innovations and Research
Volume 2, Issue 1, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy) :
Received : 28/07/2013 | Accepted on : 12/08/2013 | Published : 16/08/2013

The Effects of Concentrated Feed Level on the Milk Production and Composition

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***Abstract* – In this research, The effects of concentrated feed level on dry matter consumption of dairy cows, milk composition and some blood parametres were investigated. At the end of the experiment, it was found that increasing the level of concentrated feed (From 0.4 kg day^{-1} to 0.5 kg day^{-1} per kg milk) did not increase the milk production. However, this increase in concentrated feed level leaded to an increase in the level of milk protein (P<0.01).**

***Keywords* – Wheat, Dairy Cow, Feed Level.**

I. INTRODUCTİON

It needs concentrate feed supplementation of dairy cows at early lactation. It were given concentrate feed acording to milk production as traditional. It were determined that concentrate feed supplementation increased the milk protein at statistically significant level (P<0.05) [1]-[3]. In the research, the effects of concentrated feed level on the dry matter (DM) consumption, milk composition and some blood parameters of dairy cows at early lactation were investigated.

II. MATERİAL AND METHODS

In the experiment, totally 10 heads of holstein Friesian dairy cows each being 2 years old were used as material. Cows were taken into trial in the 1st-2nd months of their lactation. The trial their lasted for 45 days, 15 of which being acclimatization period, and the remaining 30 days being the essential period. The concentrate feed mixture (CFM) consisted of 50 % wheat, 24 % wheat, 17 % sunflower meal, 4 % soya-bean meal, 3% sawdust 1 % marble powder, 0.80 % salt and 0.20 % vitamin + mineral mix. Animals were fed with alfalfa hay, maize silage and soya-bean meal at the rates of 6 kg day^{-1}, adlibitum and 0.5 kg day^{-1}, respectively The offered feeds were assessed to cover the maintenance and production requirements for each animal [4] recommendations for dairy cows. Nutrient requirements of animals for the rest of milk production were met by feeding the cows in the first group and those in the second group at two different levels (400g and 500g for lkg of milk production). Dry matter intake was measured at the end of sample collection period by weighing the offered diet and refusals from the previous day. Milk samples were collected at the end of sample collection period. The milk from each cow was individually sampled at the delivery site of the firms in the morning. All the samples were stored at 5±1 °C before analysis or shipment. The fat-corrected milk yield (4 %) was calculated according to [5].The content of dry matter, organic matters, crude protein, crude fat and ash in the CFM were analyzed by methods [6]. Neutral detergent fiber (NDF) and acid detergent fibers (ADF) values were determined using methods outlined by [7]. The metabolizable energy value of feeds was calculated from chemical analyses of feed based on the computer software of the National Research Council (NRC) [4]. Solids-not-fat content (SNF), fat and protein components of milk were analyzed using a Milcoscan 550 device. The blood samples were obtained from jugular vein of each experimental subject 2 h post feeding at the end of each phase. Tubes were centrifuged at 2800 rpm and serum was carefully harvested and analysed within two hours. The total protein, glucose, urea and cholesterol were analysed in the blood serum using a a Beckman Coulter Synchron LX20 biochemistry device. The means of each parameter measured in the Data for yield and blood parameters were tested by analysis of variance using the Minitab Statistical Package [8] and means were compared using t-test model described by [9]: $Yijk= \mu+Ti+Pj+Eijk$ Yijk=observation, μ = population mean, Ti = The effect of additional concentrated feed level (i = 1 or 2), Pj = animals (j = 1, 2, 3, ……9 or 10) and Eijk = residual error.

III. RESULTS

Chemical composition of the CFM, corn silage and alfa is presented in Table 1. The effects of the treatments on the dry matter intake (DMI), milk yield and composition and blood metabolites are presented in Table 2, 3 and 4. Differences between high and low levels of mean daily concentrated feed consumption by dairy cows at the end of experiment were found significant statistically (P<0.01). It was determined in the study that an increase of 0.1 kg in concentrated feed level significantly increased the milk protein ratio (P<0.01).

Table 1: Chemical composition of concentrated feed mixture (CFM) and silage g kg^{-1}) DM

Nutrients	CFM	Silage	Alfa
DM	897.7	369.7	884.2
OM	855.9	350.8	788.3
CP	182.5	24.4	168.4
CF	14.2	13.6	15.7
NDF	267.0	203.0	312.0
ADF	73.5	108.3	281.2
CA	41.8	18.9	95.9
ME (kcal kg-1)[1]	2876.00	828.12	1918.71
pH		3.44	
Amonia-N		109.2	
Lactic acid		30.2	

DM, Dry matter; CP, crude protein; CF, crude fat; CA, crude ash; NEM, NDF, neutral detergent fiber; ADF, acid detergent fiber; Metabolic energy; [1]Obtained by calculation (NRC 2001)

Table 2: Effects of CFM levels on the body weight, DM intake, milk yield, milk composition

Period	Concentrate level (kg DM)	
	0.4	0.5
Silage DMI		
0	7.70±0.62	7.40±0.79
0-15	8.01±2.49	6.81±0.45
15- 45	7.38±0.97	6.82±1.20
Concentrate DMI		
0	5.01±0.43	6.16±0.30
0-15	4.85±0.13[a]	6.51±0.21[b]
15- 45	4.64±0.16[a]	6.02±0.24[b]
Live weight (kg)		
0	560.8±14	543.2±10
45	609.5±15	583.8±22

DMI, Dry matter intake

Table 3: The effects of CFM levels on milk production and composition

Period	Concentrate level (kg DM)	
0	21.39±1.50	20.87±0.59
0-15	23.50±0.38	21.87±0.87
15-45	19.26±0.32	86.4±0.05
Milk composition (g kg-1)		
SNF		
0	85.1±0.08	89.2±0.11
0-15	83.4±0.11	89.2±0.11
15-45	82.0±0.01	86.4±0.05
Fat		
0	36.2±0.22	35.6±0.19
0-15	41.6±0.13	36.6±0.25
15-45	32.7±0.04	32.9±0.33
Protein		
0	30.6±0.09	33.8±0.13
0-15	28.5±0.09[c]	32.7±0.09[d]
15-45	27.2±0.02[a]	30.8±0.05[b]

% 4 FCM, Fat-corrected milk; SNF, Solids-not-fat
Se, □;Differences between the means seperated by different letters (a,b)(c,d) in the same line are significant (P<0.01; P<0.05)

Table 4: The effect of CFM levels on blood compositions (mg dl^{-1})

Period	Concentrate level (kg DM)	
	0.4	0.5
Total protein		
0	76.0±0.13	75.2±0.08
0-45	71.0±0.30	75.0±0.18
Urea		
0	48.50±4.40	39.50±4.70
0-45	32.50±1.80	34.00±0.84
Glucose		
0	24.50±1.50	25.25±3.40
0-45	22.25±0.49	24.82±1.40
Cholesterol		
0	127.00±16.00	105.00±14.00
15-45	121.40±13.00	117.00±8.90

IV. Discussion

The difference between the concentrated feed levels in relation to the mean daily silage DM consumption of cows were found insignificant statistically. However, an increase of 1.38 kg day^{-1} in CFM consumption of dairy cows fed with concentrated feed at high levels leaded to a decline of 0.56 kg day^{-1} in the maize silage DM consumption, though not significant statistically. Differences between high and low levels of mean daily concentrated feed consumption by dairy cows at the end of acclimatization period and during the main period were found significant statistically (P<0.01). The concentrate mixture was given at the rate of 0.4 and 0.5 kg kg^{-1} milk. Owing to increased weather temperature, actual intake of concentrate mixture was far lower than the calculated amount in view of milk yield presented in study. During the experimental period, the silage DM consumption was 7.38 and 6.82 kg day^{-1} in groups given 0.4 and 0.5 kg concentrate, respectively, and 4% FCM yield in corresponding group was 19.26 and 19.72 kg. The increasing concentrate level had no significant effect on silage DM intake and milk yield, which may be due to a lower total intake of ME when 0.40 kg feed level was increased to 0.50 kg feed level. However, a slight increase of 0.46 kg was observed in the mean daily milk production of dairy cows fed with high levels of concentrated feed compared with dairy cows fed with low levels of concentrated feed, though not significant. Increasing the dietary level of concentrate increased the milk protein content significantly (P<0.01), however did not affect the DM of SNF, lactose and fat (P>0.05). The increasing level of concentrate given to animals increases the availability of energy to the rumen micro organisms. The increasing amount of starch given to cattle possibly inhibit the deamination of amino acids in the small intestine and liver as a result of higher availability of starch as recorded in earlier studies [1-3], [10]. It was determined in the research that an increase of 0.1 kg in concentrated feed level was not determined to be effective on the serum urea, glucose, cholesterol (P>0.05). This result is in accordance with the reports of [6]. However, an increase of 0.1 kg in concentrated feed level was determined to be ineffective on serum protein level. This result is not in accordance with the research result suggesting that concentrated feed level increased the serum protein [6]. This situation originates from the broader concentrated feed level used by the mentioned researcher.

V. Conclusions

An increase in concentrate level in the ration of cows from 0.4 kg to 0.5 kg kg^{-1} milk yield did not affect 4 % FCM yield, but increased (P<0.01) the milk protein content.

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