Egyptian J. Anim. Prod.,45 Suppl. Issue, Dec. (2008):159-169

MILK PRODUCTION EFFICIENCY OF FRIESIAN COWS FED DIFFERENT LEVELS OF SEAWEEDS AND ALGAE

T.I. El- Monayer, K.E.I. Etman, H.M. El-Nahas and G.F. Shahin

Animal Production Research Institute, Agricultural Research Center, Dokki, Giza, Egypt

SUMMARY

Twenty five lactating Friesian cows averaged 520 kg live body weight were assigned to evaluate the effect of supplementation of lactating Friesian cows with two levels from seaweed (dietary supplements) and algae (water supplements) on milk production efficiency. Cows were divided equally into five experimental groups and fed the same basal ration but differed in feed additives. Cows in the 1^{st} group (T1) were fed a basal ration containing concentrate feed mixture (CFM), berseem and rice straw (control). Cows in the 2^{nd} (T2) and 3^{rd} (T3) groups were fed the basal ration supplemented with 50 and 100 g seaweed/h/d, respectively. While, those in the 4^{th} (T4) and 5^{th} (T5) groups were fed the basal ration which treated with 5 and 10 ml algae/h/d, respectively. Feeding period lasted for 145 days. One digestibility trial using 15 lactating Friesian cows, three in each group was conducted to determine nutrient digestibility coefficients and feeding values. Rumen and blood parameters, feed utilization and economic efficiency were also studied. Results showed that cows fed rations supplemented with both levels of seaweed or algae improved ($P<0.05$) most nutrient digestibility coefficients and feeding values as total digestible nutrients (TDN), digestible crude protein (DCP) or starch value (SV) as well as rumen and blood parameters. Milk yield as a actual milk yield , 4% fat corrected milk, total yields of fat and protein in milk, feed efficiency and economic efficiency were the highest ($P<0.05$) for cows in T4.

In the light of the present study, greater beneficial effects on the performance of lactating cows were found with improved economic efficiency of milk production, especially those treated with 5 ml Algae/h/d was detected .

Keywords: Friesian cows, seaweed, algae, digestibility, milk yield, blood

INTRODUCTION

Increasing the human population all over the world requires continues supply of food from either plant or animal sources. In Egypt, many investigations were carried out to increase animal performance to meet the increasing demands of population by using some dietary additives or supplements in animal feeding.

Seaweeds are plentiful to increase animal production in many areas of the world, but most research works indicated that it is not good source of either energy or protein and it should be used as mainly as mineral supplement. It contain about 2% Ca, 0.4-0.5% P and being a good source of Fe and extremely high in I. Algae is an attractive possibility as a protein source, except for the high moisture content. In this respect, preliminary results of cultivated fresh water algae indicated that it contained about 50% protein, 6-7% fiber, 4-6% fat and 6% ash (Church and Pond, 1988).

Mineral contents of seaweeds according to Mehany *et al.* (2003) were 1.5% Ca, 1.05% P, 3.2% Na, 1.5 Cl, 2.5% K, 0.75% Mg, 9.5 p.p.m Cu, 10 p.p.m Co, 0.10% Fe, 0.08% I, 5 p.p.m Mn and 65 p.p.m Zn resulting beneficial effects on digestibility coefficient of most nutrients and growth performance of growing calves. However, the information on its effect on milk production efficiency of dairy cows are scare.

The objective of this study was to investigate the effect of supplementation with two levels from each of seaweed and algae on nutrient digestibility coefficients, rumen and blood parameters as well as milk production efficiency of Friesian cows.

MATERIALS AND METHODS

This study was carried out at Karada Experimental Station, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture during the period from 2006.

Animals and experimental rations

Total of 25 lactating Friesian cows averaged 520 kg live body weight and ranged between second and fourth lactating period were used in this study. All experimental cows were fed a basal ration, which contained concentrate feed mixture (CFM), Egyptian berseem (EB) and rice straw (RS) at rates of about 50%, 40%, and 10% on DM basis, respectively, according to the allowance of NRC (1988) for dairy cattle. The CFM contained 42% undecorticated cotton seed meal, 10% wheat bran, 30% yellow corn, 10% rice bran, 5% Molasses, 2% limestone and 1% common salt. Chemical analysis of different ingredient feed stuffs and calculated chemical composition of the basal ration are presented in Table (1).

Table 1. Chemical analysis of different feed stuffs and calculated chemical composition of the basal ration

Item	DM%	Chemical composition on DM basis (%)					
		CP	EE	CF	NFE	OM	Ash
Feed stuff:							
CFM	90.72	17.45	3.25	14.22	54.86	89.78	10.22
Egyptian berseem	15.40	16.10	3.20	24.50	44.85	88.65	11.35
Rice straw	90.48	3.76	1.37	35.55	40.82	81.56	18.50
Basal ration	100	15.27	3.01	20.91	49.15	88.34	11.66

* Chemical analysis according to AOAC (1985).
DM= dry matter , CP= crude protein, EE= ether extract , CF= crude fiber , NFE= nitrogen free extract , OM= organic matter

The experimental animals were divided into 5 similar groups according to live body weight, milk production and reproductive status. In the 1st group, animals were fed the basal ration without any supplements and were considered as a control group (T1). However, animals in the other tested groups were fed the control ration supplemented with 50 g/h/d (T2) and 100 g/h/d (T3) from seaweed or treated with 5 ml/h/d (T4) or 10 ml/h/d (T5) from algae in small mount of drinking water before drinking. The offered seaweed was in a form of Kelp meal (Ascophyllum nodosum) which manufactured by Acadian seaplants Limited which exported by the Gold Company in Egypt. On the other hand, the commercial name of the offered Algae is biobolem which contain 5 g sodium Algaenate/Litre

Throughout feeding period of 145 days, rations of all groups were adjusted bi-weekly according to changes in LBW and milk production. Rations were offered twice daily at 9 a.m. and 5 p.m., while fresh water was offered free before and after milking.

Digestibility trials

Five digestibility trials were conducted using 3 animals from each group to determine the digestion coefficient and nutritive value of the experimental rations using Acid Insoluble Ash (AIA) method (Van Kaulen and Young, 1977). Feces were collected quantitively for each of the three cows. Feces samples (5% of the daily feces) were individually collected, dried, grinded and kept for chemical analyses.

Experimental procedures

All experimental cows were completely machine- milked twice daily at 8.0 a.m. and 4.0 p.m. Daily milk yield was individually recorded and actual milk yield was corrected to 4% fat corrected milk (4%FCM) according to the formula of Gaines (1923). Milk samples were individually taken biweekly from evening and morning consecutive milking and kept in deep freezer for chemical analysis. Milk energy was calculated using the formula given by Overman and Sanmann (1926).

Cows were weighed biweekly at the early morning before feeding or water drink. Milk production efficiency was calculated as the amount of DM, DCP or TDN required to produce either one kg milk or fat corrected milk (FCM). Economic feed efficiency (EE %) was calculated as the ratio between the price of milk yield and cost of feeding.

Blood samples

Blood samples were withdrawn from the jugular vein of cows in each group during the digestibility trials after 3 hours from feeding. Serum was separated from the whole blood by centrifugation and kept it in frozen at -20^{o}C for chemical analysis to dertermine some blood biochemicals including concentration of total protein (Cornall *et al*. 1949), albumin (Doumas *et al*., 1971) and triglycerides (Dryer, 1970) as well as concentration of thyroid hormones (triiodothyronine, T_3 and thyroxine, T_4) according to Gruhm *et al*. (1987). While, globulin concentration was determined by differences between total protein and albumin concentration.

Rumen liquor samples

Rumen liquor samples were taken from three cows in each group before morning feeding and at 3 hours post feeding at the end of the feeding period. Each sample was strained through four folds of gauze and divided into two portions, one for immediate pH value (digital pH meter) and the second portion was preserved to determine the concentration of total volatile fatty acids (TVFA) and ammonia-N (NH_3-N) in rumen liquor. About two milliliters of each strained rumen liquor sample was fixed with 2 ml HCl (0.1 N) and 1.0 ml orthophosphoric to determine TVFA concentration as described by Abou-Akkada and El-Shazly (1964) While, concentration of NH_3-N was determined according to Conway (1978).

Statistical analysis

Data were analyzed using the computer programme of statistical analysis system (SAS, 1982). The significant differences among means were determined by Duncan's Multiple-Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Digestion coefficients and feeding values

The digestion coefficients of all nutrients and feeding values of all experimental rations are presented in Table (2). Results showed that all treatments significantly (P<0.05) increased digestion coefficients of DM as compared to the control (T1), except for T5. It is of interest to note that, both seaweed treatments (T2 & T3) significantly (P<0.05) increased CP digestibility and decreased CF digestibility, while both Algae treatments (T4 & T5) showed an opposite trend as compared to the control treatment. However, all treatments significantly (P<0.05) decreased digestibility coefficients of NFE, increased digestibility coefficients of EE and did not affect digestibility coefficients of OM as compared to control ration (T1) as shown in table (2). In agreement with the present results, dietary supplementation of seaweed had beneficial effects on digestibility coefficient of most nutrients of growing calves (Mehany *et al.,* 2003).

Table 2. Digestion coefficients and nutritive values of different experimental groups

Item	T1 (control)	T2 (50 SW)	T3 (100 SW)	T4 (5 Algae)	T5 (10 Algae)
DM intake (kg)	19.79	20.55	19.41	19.03	20.16
Digestion Coefficient (%):					
DM	72.26^b	75.57^a	74.68^a	75.22^a	73.15^b
CP	70.71^b	72.98^a	72.76^a	69.78^b	71.53^b
EE	78.75^b	88.28^a	85.79^a	87.17^a	86.21^a
CF	62.06^a	61.26^b	60.31^b	62.93^a	62.72^a
NFE	53.32^a	52.21^b	52.55^b	52.69^b	52.08^b
OM	79.16^a	79.32^a	78.88^a	79.13^a	79.00^a
Nutritive value (%):					
TDN	54.87^b	55.07^a	54.89^b	55.17^a	55.02^a
SV	47.81^b	48.69^a	48.33^a	48.74^a	48.51^a
DCP	10.79^b	11.14^a	11.11^a	10.66^b	10.92^a

a and b: Means denoted within the same row with different superscripts are significantly different at P<0.05.

T1= Control ration, T2= Control ration supplemented with 50 g seaweed/h/d, T3= Control ration supplemented with 100 g seaweed/h/d, T4= Control ration plus 5 ml algae\h\d in drinking water and T5= Control ration plus 10 ml algae\h\d in drinking water. SW= seaweed

Such trend in nutrient digestibility coefficients was reflected in different figures of nutritive values as TDN, SV and DCP in treatments, being the highest significantly

(P<0.05) of TDN and SV was recorded in T4 (5 ml Algae/h/d), followed by T2 (50g SW/h/d), which appeared to have the highest DCP% (Table 2). Digestibility coefficients and nutritive value of tested rations were similar to those reported by Hamada (1989).

Rumen liquor parameters

Results presented in Table (3) revealed that ruminal pH value significantly (P<0.05) increased only in T3 before feeding and in both T3 and T5 at 3 h post-feeding while significantly (P<0.05) decreased in T2, T3 and T4 at 6 h post- feeding comparing with the control group (T1). Generally, pH values of all treatment groups decreased at 3 h post feeding, then increased at 6 h post-feeding with Algae treatment and control groups only.

Table 3. Rumen liquor parameters of lactating cows in different experimental groups

Item	T1 (control)	T2 (50 SW)	T3 (100SW)	T4 (5 Algae)	T5 (10 Algae)
pH value:					
Before feeding	7.63^{b}	7.63^{b}	8.21^{a}	7.53^{b}	7.64^{b}
3 h post feeding	6.66^{b}	6.73^{ab}	6.89^{a}	6.49^{b}	6.98^{a}
6 h post feeding	7.02^{a}	6.55^{b}	6.77^{b}	6.62^{b}	6.99^{a}
Concentration of total VFA (meq/100 ml):					
Before feeding	4.50^{b}	4.40^{b}	4.40^{b}	4.90^{a}	4.00^{b}
3 h post feeding	6.70^{b}	7.60^{a}	6.60^{b}	6.96^{ab}	6.10^{b}
6 h post feeding	11.50^{b}	13.55^{a}	12.60^{b}	14.40^{a}	12.20^{b}
Concentration of ammonia-N (mg/100 ml):					
Before feeding	12.60^{b}	11.60^{b}	19.20^{a}	12.80^{b}	14.10^{b}
3 h post feeding	20.10^{ab}	19.70^{b}	22.49^{a}	20.60^{ab}	21.00^{ab}
6 h post feeding	16.40^{b}	19.10^{a}	19.30^{a}	17.20^{b}	17.30^{b}

a , b: Means denoted within the same row with different superscripts are significantly different at P<0.05.
SW= seaweed, VFA= volitale fatty acid

Total VFA's concentration in rumen liquor significantly (P<0.05) increased in T4 before feeding, in T2 at 3 h post-feeding and in T2 and T4 at 6h post-feeding. Generally, Total VFA's concentration in all treatment groups increased by advancing post feeding time, but the rate of increase was higher between 3 and 6 h post-feeding than between before feeding and 3 h post-feeding (Table 3).

Concentration of NH_3-N in rumen liquor significantly (P<0.05) increased in T3 at both before feeding, 3h- 6h post feeding as compared to the control (T1). On the other hand, all pH values in all treatment groups showed generally lower values at 6 h post feeding (Table 3).

It is worthy noting that increasing seaweed level from 50 to 100 g or algae level from 5 to 10 ml appeared to increase pH value and concentration of NH_3-N and decreased total VFA's concentration at all sampling times (Table 5). Similar results were reported by Baek *et al.* (2004).

Blood biochemicals and thyroid hormones

Results in Table (4) revealed that concentration of total proteins significantly ($P<0.05$) increased by low level of SW (T2) and high level of Algae (T5). This increase was associated with significant ($P<0.05$) increase in albumin concentration with T2 and not significant with T3, T4 and T5. But T5 showed significant ($P<0.05$) increase in globulin concentration. However, the high level of SW (T3) or low level of Algae (T4) did not affect concentration of total proteins or their fractions and did not differ significantly than in T1, T2 and T5. Such trends were reflected in nearly similar AL/GL ratios in all treatments.

Table 4. Concentration of some biochemicals and thyroid hormones in blood serum of lactating cows in experimental groups

Item	T1 (control)	T2 (50 SW)	T3 (100 SW)	T4 (5 Algae)	T5 (10 Algae)
Serum biochemicals:					
Total protein (g/dl)	8.28^{b}	8.82^{a}	8.63^{ab}	8.71^{ab}	8.80^{a}
Albumin (g/dl)	4.28^{b}	4.78^{a}	4.52^{ab}	4.58^{ab}	4.45^{b}
Globulin (g/dl)	4.00^{b}	4.04^{b}	4.11^{ab}	4.13^{ab}	4.35^{a}
AL/ GL ratio	1.07	1.18	1.10	1.11	1.05
Triglycerides (mg/dl)	115.87^{b}	123.06^{a}	120.09^{ab}	126.60^{a}	119.98^{b}
Thyroid gland hormones (ng/dl):					
T_3	102.49^{b}	112.28^{a}	105.10^{b}	109.18^{a}	104.87^{b}
T_4	2.27^{b}	2.75^{a}	2.42^{b}	2.71^{a}	2.61^{ab}

a ,b: Means denoted within the same row with different superscripts are significantly different at $P<0.05$.

SW= seaweed, T_3= Triiodothyronine, T_4= Thyroxine

It is of interest to note that concentration of triglycerides and thyroid hormones (T3 and T4) appeared the same trend of total proteins concentration, significantly ($P<0.05$), being the highest with low level of SW (Table 4). This agreed with the results of Lee *et al*. (2005). Also, the observed increase in most biochemicals studied and thyroid hormones in T2 might be attributed to the recorded highest nutritive values as TDN, SV and DCP for T2 (Table 2).

Milk production

Milk yield

Results presented in Table (5) showed that the ration containing either low or high SW level (T2 and T3) and high Algae level did not affect milk production, while level of 5 ml algae (T4) significantly ($P<0.05$) appeared the highest milk yield as actual (AMY) and 4% FCM milk yield by about 24 and 32 % compared to the control, respectively. Interestingly to observe that the recorded improvement in milk yield may be attributed to improving concentration of total proteins and triglycerides as well as thyroid hormones as metabolic hormones in blood serum of cows in T4 as shown in Table (4). Similar results regard to milk yield were reported by Nikil' Burskii (1991), Tolokonnikov *et al*. (1992), Risheng and Changlin (1998), Baek *et al*. (2004) and Lee *et al*. (2005).

The most important finding in the present study point of view was that both SW levels significantly (P<0.05) increased in percentages of fat and protein in milk rather than increasing milk yield as AMY of 4% FCM (Table 5). However, when milk composition was expressed as daily yields, cows in T4 showed significantly (P<0.05) the highest yields from fat, protein, lactose, total solids and solids not fat

Table 5. Milk yield and composition of cows in experimental groups

Item	T1 (control)	T2 (50 SW)	T3 (100 SW)	T4 (5 Algae)	T5 (10 Algae)
Average daily milk yield (kg):					
Actual milk	14.90^b	15.22^b	15.60^b	18.43^a	14.97^b
4% FCM	13.02^b	14.54^b	14.78^b	17.21^a	13.58^b
Milk composition (%):					
Fat	3.13^b	3.70^a	3.65^a	3.56^b	3.38^b
Protein	2.34^b	2.43^a	2.46^a	2.38^b	2.35^b
Lactose	4.39^a	4.16^b	4.29^{ab}	4.31^{ab}	4.35^a
Total solids	10.60^b	10.90^a	10.82^{ab}	10.92^a	10.69^b
Solids not fat	7.47^a	7.20^b	7.17^b	7.36^a	7.31^{ab}
Daily yield (g):					
Fat	466.37^b	563.14^{ab}	569.40^{ab}	656.11^a	505.99^b
Protein	348.66^b	369.85^b	383.76^{ab}	438.63^a	351.80^b
Lactose	654.11^b	633.15^b	669.24^b	794.33^a	651.20^b
Total solids	1579.40^b	1659.98^b	1687.92^b	2012.56^a	1600.29^b
Solids not fat	1113.0^b	1095.84^b	1118.52^b	1356.45^a	1094.3^b
Energy (kcal)	650.29^b	716.01^a	710.25^a	699.87^{ab}	679.12^b

a, b: Means denoted within the same row with different superscripts are significantly different at P<0.05.
SW=seaweed FCM= fat corrected milk

The present results indicated pronounced effect of 5 ml\h\d Algae (T4) on increasing milk yield (AMY and 4% FCM) and in turn total yield of all milk components, while SW increased only milk composition in term of percentages of fat and proteins in milk. The obtained results are in agreement with those reported by Nikil' Burskii (1991), Tolokonnikov *et al*. (1992) and Papadopoulos *et al*. (2002).

Feed utilization and economic efficiency

Feed efficiency expressed as kg DM, TDN, SV and DCP intake required to give one kg AMY or 4%FCM (Table 6). At the same time the feed efficiency can be calculated with respect to TND or DCP. From these results, cows in T4 fed diet supplemented with 5 ml Algae showed the best feed efficiency as DM, TDN, SV and DCP for kg milk production as AMY or 4% FCM, while cows in T2 and T5 showed the poorest feed efficiency as compared to the control cows (T1). Such trend was attributed to the lowest total DM intake and the highest milk yields in T4 and T3, while the opposite was obtained for T2 and T5.

Table 6. Feed utilization and economic efficiency of lactating cows in different experimental groups

Item	T1 (Control)	T2 (50 SW)	T3 (100 SW)	T4 (5 Algae)	T5 (10 Algae)
Average LBW	520	540	510	500	530
Feed intake (kg)as fed:					
CFM	10.40	10.80	10.20	10.00	10.60
Berseem	52.00	54.00	51.00	50.00	53.00
Rice straw	2.600	2.70	2.55	2.50	2.65
DM intake (Kg):					
CFM	9.43	9.79	9.25	9.07	9.61
Berseem	8.01	8.32	7.85	7.70	8.16
Rice straw	2.35	2.44	2.31	2.26	2.39
Total	19.79	20.55	19.41	19.03	20.16
Daily milk yield (kg):					
Actual-milk-yield (AMY)	14.90	15.22	15.60	18.43	14.97
4% FCM	13.02	14.54	14.78	17.21	13.58
Average daily feed intake (kg):					
Total DM	19.79	20.55	19.41	19.03	20.16
TDN	10.86	11.32	10.65	10.50	11.09
SV	9.46	10.01	9.38	9.28	9.78
DCP	2.05	2.19	2.07	1.94	2.11
Feed efficiency:					
Kg DM /kg AMY	1.33	1.35	1.24	1.03	1.35
Kg DM/kg 4% FCM	1.52	1.41	1.31	1.11	1.49
Kg TDN/kg AMY	0.729	0.744	0.683	0.569	0.741
Kg TDN/kg 4% FCM	0.834	0.779	0.721	0.610	0.817
Kg SV/kg AMY	0.635	0.658	0.601	0.504	0.653
Kg SV/kg 4% FCM	0.727	0.688	0.635	0.539	0.720
Kg DCP/kg AMY	0.138	0.144	0.133	0.105	0.141
Kg DCP/kg 4% FCM	0.157	0.151	0.140	0.113	0.155
Feed cost (L.E.)/kg milk as:					
AMY	1.00	1.02	0.94	0.78	1.02
4% FCM	1.15	1.07	0.99	0.84	1.12
Economic efficiency (%):					
AMY	249	245	266	320	245
4% FCM	217	234	252	299	222

The observed improvement in feed efficiency of cows in T4 and T3 was reflected in significantly ($P<0.05$) the cheapest feed cost in T4 and T3 as compared to the treatments (T2 and T5) and the control group (T1, Table 6).

Regarding data of feed cost and price of each kg produced, cows in T4 showed significantly ($P<0.05$) the highest economic efficiency as AMY or FCM as compared to the other groups (Table 6). Similar trend was reported by Risheng and Changlin

(1998). It could be conclude that animals group fed T4 containing 5ml Algae\h\d as supplemented ration tended to have higher feed efficiency and economical efficiency.

REFERENCES

Abou-Akkada, A.R. and K.EL-Shazly, 1964. Effect of absence of ciliate protozoa from the rumen on microbical activity and growth of lambs Applied microbiology, 12: 384.

A.O.A.C., 1985. Official Methods of the Association of Official Agriculture chemists.

Baek, I.K, W.J. Maeng, H.G. lee, S.R. Lee, J.K. Ha, S.S. Lee and J.H. Hwang, 2004. Effects of the brown sea weed residues supplementation on in vitro fermentation and milk production and composition of lactating dairy cows. J. Anim. Sci. and Techn., 46(3): 373-386.

Church, D.C. and W.G. Pond, 1988. Basic of animal nutrition and feeding. 3rd Ed., John Wiley & Sons, Inc., New York, USA.

Conway, E.J., 1978. *Microdiffusion Analysis and Volumetric Error.* 4th Ed. The McMillian Co., N. Y.

Cornall, A.G; C.J. Badawill and M.M. David, 1949. Determination of serum proteins by means of the buiret reaction. J. Bio Chem. 177: 751.

Doumas, B, W. Wabson and H. Briggs, 1971. Albumin standards and measurements of serum with bromocresol green. Clin. Chem., 31:87.

Dryer, R.L., 1970. In Fundamentals of clincal chemistry. N.W. Tietz, Ed. W. B. Saunders, Phildelphia, P 329.

Duncan, D.B., 1955. Multiple Range and Multiple F-test. Biometrics, 11.1.

Gaines, W.L., 1923. Relation between percentage of fat content and yield of milk. 1-correction of milk yield for fat content Agric. Exo. Sta. bull. 245.

Gruhm, J.G, C.P. Barsano and Y. Kumar, 1987. The development of tests of thyroid function. Arch. Pathol. Lab. Med, 111:84.

Hamada, T., 1989. A new supplementary molasses block feed for the ruminant to improve the production efficiency under poor feeding condition. JARQ (Japan Agri. Res. quarterly. 23 (1): 59-64.

Lee, H.G, Z.S. Hong, Z.H. Li, Xa, Cx, X. Jin, M.G. Jin, H.J. Lee, N.J. Choi, T.S. Koh and Y.J. Choi, 2005. Effect of brown seaweed waste suppmlentation on the lactation performance and endocrine physiology of Holstein lactating cows. J. Ami. Sci. & Tech. 47(4) 573-582.

Mehany, S.B., W.H. Abdel- Malik, K.E.I. Etman and M.F. El-Says, 2003. Effect of Monensin and/or sea weeds as feed additives on performance of Friesian calves, feed utilization and economical efficiency. Egyptian J. Nutrition and feeds. 6 (Special Issue): 1059-1065

National Research Council, 1988. Nutrient Requirements of Dairy cattle. 6th ed. Acad. Sci. Washington, DC.

Nikil' Burskii, N.I., 1991. Laminaria in diets for sheep. ovtsevodstvo. (1): 33

Overman, O.R. and F.P. Sanman, 1926. The energy of milk as related to composition 3rd Agri. Exp. Sta. bull., 282.

Papadopoulos, G; C. Goulas; E. Apostolaski and R. Abril, 2002. Effect of dietary supplements of algae, containing polyunsaturated fatty acids, on milk yield and the composition of milk products in dairy ewes. J. Dairy Res. (69) 357-365.

Risheng, M. and Changlin, T. 1998. Effects of supplementing kelp meals on milk production in cows. China Dairy cattle (1): 20-22.
S.A.S., Statistical Analysis System, 1982. User's guide: Statistics S.A.S., Inst., Cary, Nc. Releigh.
Tolokonnikov, Yu.A, I.S. Podokopnaya and T.N. Pisarskaya, 1992. Phyllophora in the diet for cows. Zoolekhniya (516):15-17
Van Keulen, J. and B.A. Young, 1977. Evaluation of acid- insoluble- ash as a natural marker in ruminant digestibility studies. J. Anim. Sci., 44:2.

كفاءة إنتاج اللبن لأبقار الفريزيان المغذاه علي نسب مختلفة من الأعشاب البحرية والطحالب

طارق إبراهيم المنير، كامل عثمان إبراهيم عثمان، حسن محمود النحاس، جمال فاروق شاهين

معهد بحوث الإنتاج الحيوانى، مركز البحوث الزراعية، الجيزة، مصر

استخدم فى هذه الدراسة عدد ٢٥ بقرة فريزيان حلابة متوسطة الوزن ٥٢٠ كجم في خمسة معاملات مستقلة لدراسة تأثير إضافة نسب وأنواع مختلفة من العشب البحري والطحالب علي الأداء الإنتاجي والكفاءة الاقتصادية للأبقار الحلابة واستمرت تجارب التغذية لمدة ١٤٥ يوم حيث تمت تغذية الأبقار تحت المعاملات كالآتي:

المعاملة (١): علف مركز + برسيم+قش ارز (مجموعة الكنترول)

المعاملة (٢):عليقة الكنترول +٥٠ جم عشب بحري/ حيوان/يوم

المعاملة (٣):عليقة الكنترول +١٠٠ جم عشب بحري/ حيوان/يوم

المعاملة (٤):عليقة الكنترول +٥ مل طحلب/ حيوان/يوم

المعاملة (٥):عليقة الكنترول +١٠ مل طحلب/ حيوان/يوم

وكانت نسبة العلف المركز إلي المادة الخشنة ١:١ في المعاملات المختلفة وكانت المقررات طبقا لـ NRC سنة ١٩٨٨. أجريت خمس تجارب هضم باستخدام ١٥ بقرة فريزيان حلابة(بكل تجربه ثلاث حيوانات) لتقدير معاملات الهضم والقيمة الغذائية للعلائق الخمسة المستخدمة في تجارب التغذية كما درس تأثير إضافة الأعشاب البحرية والطحالب علي مكونات الدم وتركيز هرمونات الغدة الدرقية وحالة نشاط الكرش. وقد أوضحت النتائج المتحصل عليها أن الأبقار المغذاة علي علائق أضيفت لها الأعشاب البحرية والطحالب أظهرت معنويا (٥%) زيادة في معاملات الهضم لمعظم المركبات الغذائية وانعكس ذلك علي القيمة الغذائية للعلائق كمركبات كلية مهضومة أو بروتين مهضوم أو قيمة نشوية كما أوضحت النتائج إن ّإضافة الأعشاب البحرية والطحالب آدت إلي زيادة في إنتاج اللبن المعدل والكفاءة الاقتصادية. فضلا عن ذلك فإن هذه الإضافات أدت إلي زيادة في محتويات اللبن من الدهن، البروتين، الجوامد الكلية، الطاقة، محتويات الدم من الترای ايودوثيرونين، الثيروكسين، البروتين الكلي والجليسريدات.

في ضوء هذه النتائج استنتج إن لإضافة الأعشاب الطحالب (5 مل – المعاملة ٤) إلي العلائق آدت إلي زيادة كفاءة إنتاج اللبن من الأبقار الحلابة كما أدت إلي انخفاض تكلفة التغذية وزيادة الكفاءة الاقتصادية مقارنة بباقى المعاملات.