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Effect of Using Dried Distiller Grains with Soluble (Ddgs) as a New Protein Source on Meat and Milk Production and their Qualities:
1- Using Dried Distiller Grains with Soluble (DDGS) Instead of Cotton Seed Cake or Soybean Meal Cake in Rations of Lactating Friesian Cows

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ABSTRACT

Twenty four Friesian cows at 2^{nd} lactating season with average live body weight (LBW) 383 Kg. Animals were randomly distributed into four similar groups (6 animal each), to be fed concentrate feed mixture (CFM) containing cotton seed cake or soybean meal or DDGS as a source of protein in rations B, C and D, respectively compared to that containing each of them in ration A as a control ration.Feeding trial lasted about 210 days and animals fed CFM, berseem hay and rice straw with rate of 60, 25 and 15% respectively. These proportions were chosen to achieve approximately isonitrogenous rations containing a bout 13 % CP. The results obtained showed that digestibility coefficient of OM,CP,EE and NFE for ration D (containing DDGS) showed significant ($P<0.05$) higher than the others, while differences in DM and CF digestibility were higher significant ($P<0.05$) with feeding on ration C than A or B but without significant effect with ration D. Feeding values for ration D expressed as TDN (%), DCP (%), DE and ME (M cal / Kg DM) were significant ($P<0.05$) higher than the other rations. Ration D containing DDGS tended to significant ($P<0.05$) increased for both actual milk (9.028 kg) and 4% FCM yield (8.906 kg) and improved milk composition and their yields than rations A and B. Feed efficiency as kg DM/Kg actual milk or kg 4% FCM yields was the best with ration D, than the other rations. Ration D showed the cheapest feed cost to get one kg actual milk (2.072 LE) or kg 4% FCM yield (2.100 LE). Also, ration D gave the highest net revenue (35.464 LE) and economical efficiency (1.90). The mean values of the NH_3-N, Total –N and NPN (mg/100ml) concentrations were significant ($P<0.05$) higher by feeding on ration D. Blood parameters showed that there were no adverse effects, however these parameters were within the normal values.

Keyword: DDGS, digestibility coefficients, feeding values, milk production, economic efficiency, and blood and rumen parameters

INTRODUCTION

The big problems in animal production projects are the shortage of feed stuff especially the sources of protein. Because of little and decrease of protein sources and higher its price, some other attempts were done to solve this problem by improve feedstuff and increase their feeding values (Etman *et al.,* 2011; Arelovich *et al.,* 2000; Bremer *et al.,* 2005; El-Sayed *et al.,* 2002; Faichney and White, 1977).

Dried distiller grains with soluble (DDGS) are the most by –product for fermentation and it is the important sources of protein for feeding meat or milk animals. DDGS is a co-product of ethanol industry which contains more energy and protein (Etman *et al.,* 2010). This product have been used in many trials as a source of energy or protein in rations formulation of dairy animals, beef steers, heifers, sheep, poultry and swine(May *et al.,* 2009; Leupp *et al.,* 2009 and Reed *et al.,* 2006). In this respect, Etman *et al.* (2011) showed that the use of DDGS with rate 27% in rations of fattening buffalo calves tended to higher digestibility with better performance of fattening animals. Also, Etman *et al.* (2014) reported higher daily gain of growing lambs with using 30% DDGS in rations of sheep.

The objective of this work was to study the effect of using DDGS as a source of protein in rations formulation of lactating Friesian cows on digestibility, feeding values, milk yield and economical efficiency.

MATERIALS AND METHODS

Twenty-four cows averaging 383 kg live body weight and at the 2^{nd} lactation season were chosen and divided into four similar groups (6 in each). The trial was conducted at the Animal House belonging to Animal Production Research Institute and El-Ma'dway station at Masr - Alexandria desert road, Egypt. All animals were randomly assigned to receive four experimental rations. The experimental rations contained concentrated feed mature (CFM), berseem hay and rice straw with rate of 60, 25 and 15%, respectively.

Cotton seed cake, soybean and dried distiller grain were contributed together to get 50% as protein of CFM for ration A, while the 50% protein content of CFM for rations B, C and D were come from cotton seed cake or soybean meal or dried distiller grains, respectively.

All animals were received experimental rations according to NRC (1989). Daily allowance from CFM and roughages were adjusted every two weeks based on milk production and body weight changes. All animals were milked twice daily at 8.00 a.m. and 4.00 p.m. Milk yield were individually recorded and converted to 4% fat corrected yield according to Gaines (1923).Representative samples of milk yield were prepared to make composite milk sample for analyses.

At the middle period of feeding trial, four digestibility trails using three cows chosen randomly from each group to determine the digestibility coefficients and feeding values of experimental rationS using Acid Insoluble Ash (AIA) procedure as a natural marker according to Van Keulen and Young (1977). Each digestibility trail consisted of 7 days collection period . Feces were collected for each animal to prepare individual feces samples for analysis. Rumen liquor samples were also taken from the same three animals of each group at 3hr. post feeding, during 3 successive days, using stomach tube. samples were filtered through two layers of surgical gauze and preserved for determine some measured. Rumen pH was immediately measured using digital pH meter. At the same time, blood samples were taken from the jugular vein of the animals belonging to the digestibility trial at 3hr. after feeding. Blood serum was preserved to measure some blood parameters.

Analysis procedures:

Representative samples of feeds, feces and refused from feeds were analyzed to determine DM, CP, EE, CF and ash contents according to A.O.A.C (2000).

Composite milk samples were analyzed for fat, protein and total solid by milk- scan model 133B, while lactose was determined by differences. The filtered rumen liquors were analyzed to determine total Nitrogen (TN), protein nitrogen (PN) and ammonia-nitrogen (NH3-N) according to AOAC (2000), while total volatile fatty acids (VFA's) concentration were determined according to Eadie *et al.* (1976). Blood serum was separated from the whole blood to determine the total protein, albumin, transaminase activities and creatinine and urea –N using commercial kits of Bio-Merieus, lab, France.

Data were statistically analyzed as one way analysis of variance using general linear model (GLM) program of SAS (1996) according to the following model:

$$Yij=\mu + Ti + eij$$

where:

Yij = the observation
μ = Over all means
Ti = effect of treatment
eij = experimental error

The significant differences among means were tested using Duncan Multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Data in Table (1) showed different ingredients of concentrate feed mixture (CFM) of experimental rations. The CFM of ration A contains cotton seed cake, soybean meal and DDGS as a source of 50% protein, while the previous successive ingredients were contributed with 50% as protein of CFM for rations B, C and D, respectively. In addition, all CFM for all experimental rations were almost equal in DM, CP and OM% as shown in Table (2), while EE, CF, NFE and ash contents had some little variation. On the other hand, chemical composition of berseem hay, rice straw, cotton seed cake, soybean and dried distiller grains with soluble (DDGS) were illustrated in Table (2). They were nearly similar analysis as mentioned by Etman *et al.* (2014). It could be noticed that, the DDGS had nearly equal CP with cotton seed cake, but it had higher EE and lower CF % than those of cotton seed cake.

Table 1. Ingredients of concentrate feed mixture (CFM) containing different sources of protein for experimental rations.

Items	CFM of experimental rations			
	A	B	C	D
Ingredients (%):				
Yellow corn	29	26	26	21
Cotton seed cake	8.85	27	-	-
Soybean meal	5.23	-	16	-
Dried distiller grains (DDGS)	8.52	-	-	26
Wheat bran	15.40	22	5	20
Rice bran	15	10	35	15
Molasses	15	10	15	15
Protected fat	-	2	-	-
Limestone	2	2	2	2
Salt	1	1	1	1
	100	100	100	100

Table 2. Chemical composition of ingredients and concentrate feed mixtures.

Items	DM%	Chemical composition on DM basis (%)					OM%
		CP	EE	CF	NFE	Ash	
Berseem hay (BH)	90.65	15.40	3.12	24.54	47.14	9.80	90.20
Rice straw (RS)	91.52	3.08	1.64	44.25	39.08	11.95	88.05
Cotton seed cake (CSK)	90.14	26.00	1.43	24.12	42.61	5.84	94.16
Soybean meal (SB)	88.16	44.02	1.45	7.86	39.75	6.92	93.08
Dried distiller grain (DDGS)	89.75	27.10	8.04	8.15	49.28	7.43	92.57
* Concentrate feed mixture (CFM)of:							
CFM (A)	90.81	14.15	4.73	7.35	65.03	8.74	91.26
CFM (B)	91.76	14.24	5.26	8.64	63.84	8.02	91.98
CFM (C)	91.12	14.50	6.24	6.38	63.04	9.84	90.16
CFM (D)	91.68	14.25	5.85	6.63	63.93	9.34	90.66

*** CFM of ration (A) containing, cotton seed cake, soybean and DDGS as a source of protein which contributed together to get 50% crude protein , while cotton seed cake, soybean and DDGS of ration B, C and D, respectively contributed with 50% as source of crude protein.**

Average daily feed intake and calculated composition of experimental rations:

Table (3) revealed that the total DM intake with four successive groups were nearly equal, recording 11.400, 11.542, 11.520 and 11.471 kg DM/ day/ head with rations A, B, C and D, respectively.

On the other hand, the calculated composition of experimental rations were almost equal in all nutrients, indicating some little increase in CF % of rations A and B (17.19 and 17.96%) versus 16.61 and 16.76 for rations C and D, respectively. However, all experimental rations were isonitrogenous and isocaloric, as shown in Table (3).

The results also revealed that the digestibility coefficients of OM, CP, EE and EE of ration D were significantly (P<0.05) higher than those of other C and D were significantly (P<0.05) higher than those of others. The differences among rations A, B and C in the most of nutrients digestibility were not significant, but digestibility coefficients of DM and CF for ration C were significant (P<0.05) higher than those of rations A and B (Table 3). Generally, the ration D (containing DDGS) appeared the highest (P<0.05) significant of most nutrients. It might be due to higher CF fractionation of ration D such as ADF and NDF as reported by Etman *et al.* (2014). They found that the NDF was 46% for DDGS versus 40 and 15% for undecorticated cotton seed cake and soybean meal, respectively. Also, increase in digestibility coefficients of most nutrients for ration D were found with increasing DDGS levels in CFM of ration as a source of protein (Etman *et al.,* 2014a).

The results presented in Table (3) showed feeding values as TDN (%), DCP(%)(%), DE (Mcal/ Kg DM) and ME (Mcal/ Kg DM) for different experimental rations. The nutritive value as TDN and DCP (%) were significantly (P<0.05) higher for ration D compared with the other rations. Also, DE (Mcal / Kg DM) and I (Mcal / Kg DM) of ration d take the same previous trend. Increasing feeding values as TDN or DCP for rations D might be due to higher digestibility of most their nutrients. Results of TDN, DCP and DE for ration C were agreement with those reported by Walter et al. (2012) and Etman *et al.* (2014). They reported that using DDGS as a source of protein caused higher nutrients digestibility. The feeding value of ration D expressed as TDN, DCP and DE were similar with those recorded by Etman *et al.* (2014) and El-Monayer (2015). Moreover, Etman *et al.* (2010& 2011) concluded that increasing and improving in digestibility coefficients and nutritive values of ration containing DDGS might be attributed to higher availability of the nutrient contents of DDGS as reported by Leupp *et al.* (2009). Generally, ration D (containing DDGS) appeared to higher digestibility and feeding values than other rations.

Table 3. Average daily feed intake, composition, digestibility coefficients and nutritive values of different experimental rations by lactating Friesian cows.

Items	Experimental rations			
	A	B	C	D
Av. daily feed intake (Kg DM/h):				
Concentrate feed mixture (CFM)	6.840	6.930	6.912	6.882
Berseem hay (CFM)	2.850	2.880	2.880	2.868
Rice straw (RS)	1.710	1.732	1.728	1.721
Total DM intake	11.400	11.540	11.520	11.471
Composition of experimental rations (%DM basis):				
DM	90.88	91.45	91.06	91.40
OM	90.52	90.95	89.86	90.16
CP	12.80	12.85	13.01	12.86
EE	3.76	4.19	4.77	4.54
CF	17.19	17.96	16.61	16.76
NFE	56.77	55.95	55.47	56.00
Ash	9.48	9.05	10.14	9.84
Digestibility coefficients of experimental rations (%):				
DM	85.44^b	86.92^b	88.63^a	89.15^a
OM	90.06^b	91.20^b	92.39^b	95.14^a
CP	65.50^b	64.75^b	67.82^b	70.94^a
EE	69.42^b	70.12^b	70.04^b	74.15^a
CF	58.86^b	60.81^b	62.12^a	63.26^a
NFE	70.38^b	69.73^b	70.14^b	72.50^a
Feeding values:				
TDN (%)	64.32^c	64.87^c	65.57^b	67.90^a
DCP (%)	8.38^c	8.32^c	8.82^b	9.12^a
*DE (Mcal/Kg DM)	2.84^b	2.86^b	2.89^b	2.99^a
*ME (Mcal/ Kg DM)	2.32^b	2.34^b	2.35^b	2.44^a

*** DE was calculated according to Church and Pond (1982).**
*** ME= DE *0.82 (NRC,2001).**
a, b and c: Means in the same row with different superscripts are significantly (P<0.05) different

Actual, fat corrected milk (FCM) yields and its composition:

The results obtained in Table (4) showed that the actual milk yield significant (P<0.05) increased with animals fed rations C and D compared with those fed rations A and B. The same previous trend was observed with 4% fat corrected milk (4% FCM) yield. It could be noticed that, concentrate feed mixture containing DDGS (ration D) tended to higher both actual and 4% FCM yields than the others owing to improve digestibility coefficients and increase feeding values of these ration.

Table 4. Average daily actual, 4% fat corrected milk (FCM) yields and its composition for lactating Friesian cows fed different experimental rations.

Items		Experimental rations			
		A	B	C	D
Av. milk production (Kg /head/day):					
Actual milk yield		8.260^c	8.504^b	8.845^a	9.028^a
Av. milk composition (%) and its yield (gm/ cow/day):					
Fat	(%)	3.75^b	3.82^b	3.95^a	3.91^a
*4% FCM yield		7.954^c	8.277^b	8.773^a	8.906^a
Fat yield	(gm)	310^b	325^b	349^a	353^a
Protein	(%)	3.27^b	3.30^b	3.36^a	3.34^a
Protein yield	(gm)	270^b	281^b	297^a	302^a
Lactose	(%)	4.65^b	4.82^b	4.95^b	5.44^a
Lactose yield	(gm)	384^c	410^{bc}	438^b	491^a
**TS	(%)	12.87^c	13.15^b	13.58^b	13.84^a
TS yield	(gm)	1063^b	1118^b	1201^a	1249^a
***SNF	(%)	9.12^c	9.33^c	9.63^b	9.93^a
SNF yield	(gm)	753^b	793^b	852^a	896^a

a, b and C: Means in the same row with different superscripts are significantly (P<0.05) different.
***Fat corrected milk ** Total sold *** Sold not fat**

Data presented in Table (4) revealed that all milk composition as fat and protein (%) of animals fed rations D and C showed the highest (P<0.05) values than others. While others milk contents (lactose, T.S and SNF %) increased (P<0.05) with animals fed ration D than others. The fat ,protein T.S and SNF yields of animals fed rations C and D showed the highest (P<0.05) values than others. While lactose yield increased (P<0.05) with animals fed ration D than others.

From the previous data, it could be seen that animals fed ration C (containing SBM) and ration D (containing DDGS) had significantly (P<0.05) higher of most milk composition and their yields (Table 4). It could be noticed that using cotton seed cake, soybean meal or DDGS as a source of protein in ration of lactating Friesian cows tended to higher milk yield and its composition. These results were in agreement with those reported by Etman *et al.* (2012) who found that actual and 4% FCM yields increased with increasing dried distiller grains with soluble as a source of protein in rations of lactating Friesian cows. On the other hand, Anderson *et al.* (2006), Janicek *et al.* (2008), Kelzer *et al.* (2009) and Zhang *et al.* (2010) showed higher milk yield with increasing DDGS levels in rations of lactating cows. Also, it could be noticed that increasing of milk yield and its composition of animals fed ration D (containing DDGS) might be due to higher in fermented NDF of DDGS than the other rations as reported by Etman *et al.* (2014).

Average daily feed conversion rate and feed efficiency of experimental rations:

Data presented in Table (5) showed that the DM intake (kg/h/d) wase almost equal in different experimental groups, showing somewhat higher with groups fed CFM containing cotton seed cake (11.542 kg/h/d) and soybean meal (11.520 kg/h/d). However, the TDN intake showed the highest value with group fed ration containing DDGS (7.789 kg/h).At the same time, DCP intake appeared the same higher previous trend as TDN intake. Increasing feed intake of animals fed ration containing DDGS (ration D) might be attributed not only higher digestibility coefficients of all nutrients of these ration, but also higher it's feeding values such as TDN, DCP, DE and ME (table 3). These results were agreement with those reported by Etman *et al.* (2011& 2014) and El-Shinnawy *et al.* (2015).

The feed efficiency was calculated as kg DM, TDN or DCP per kg actual milk yield or kg 4% FCM yield, as shown in Table (5). It could be noticed that the difference in feed utilization efficiency in case of actual or 4% FCM yields among different experimental rations were not significant. However, the animals fed ration D (containing DDGS) showed the most feed efficiency as amounts DM intake to get one Kg actual or 4% FCM yields, being 1.271 or 1.288 kg, respectively. On the other hand, feed utilization as kg TDN/ kg actual or 4% FCM yield found to be most efficient for animals fed ration C (containing soybean meal) with no significant difference, while feed efficiency as Kg DCP/ Kg actual or 4% FCM yield was almost equal among different experimental groups without significant differences. Better feed efficiency with animals fed ration containing DDGS was reported by Etman *et al.* (2014) and El-Shinnawy *et al.* (2015).Generally, using DDGS in rations tended to increase milk yield and improve feed utilization efficiency.

Table 5. Average daily feed conversion rate and feed efficiency for lactating cows fed the experimental rations.

Items	Experimental rations			
	A	B	C	D
No. animals	6	6	6	6
Av. LBW (Kg)	380	385	382	384
Experimental period (day)	210	210	210	210
Av. daily feed unit intake:				
DM (kg/ h/d)	11.400	11.542	11.520	11.471
TDN (kg/ h/d)	7.332	7.492	7.554	7.789
DCP (kg/ h/d)	0.955	0.961	1.016	1.046
Av. actual milk yield (kg)	8.260^{c}	8.504^{b}	8.845^{a}	9.028^{a}
Av.4% FCM yield (kg)	7.954^{c}	8.277^{b}	8.773^{a}	8.906^{a}
Feed efficiency with actual milk :				
Kg DM/ kg milk yield	1.380	1.358	1.302	1.271
Kg TDN/ kg milk yield	0.888	0.881	0.845	0.863
Kg DCP/ kg milk yield	0.116	0.113	0.115	0.116
Feed efficiency with 4% FCM:				
KgDM/ kg 4% FCM yield	1.433	1.395	1.313	1.288
KgTDN/ kg 4% FCM yield	0.922	0.905	0.861	0.875
KgDCP/ kg 4% FCM yield	0.120	0.116	0.116	0.117

a, b and c: Means in the same row with different superscripts are significantly (P<0.05) different.

Feed cost and economic efficiency

From data in Table (6) It could be noticed that the cheapest cost of feed intake per head was recorded with ration D (18.704 LE/h). The same previous trend was observed with feed cost/ kg milk or 4% FCM yields, recording 2.072 and 2.100 LE respectively. Moreover, the highest net revenue and net revenue/ kg 4%FCM yield was obtained with animals fed ration D than those fed other rations. At the same time, the best (P<0.05) net revenue per kg milk yield was observed with animal fed rations C and D than those fed other rations. Consequently, the experimental ration D (containing DDGS) appeared to the best economical efficiency (2.90) followed by ration C (2.76). The previous trend was reported by Etman *et al.* (2011& 2014).

Table 6. Average feed cost and economical efficiency for lactating Friesian cows fed different experimental rations.

Items	Experimental rations			
	A	B	C	D
Av. daily feed ingredient intake, as fed (kg/ head):				
Concentrate feed mixture (CFM)	7.532	7.552	7.586	7.507
Berseem hay (BH)	3.144	3.186	3.177	3.164
Rice straw (RS)	1.868	1.892	1.888	1.880
Av. daily milk yield (kg/head):				
* Actual milk yield	8.260^{c}	8.504^{b}	8.845^{a}	9.028^{a}
4% FCM yield	7.954^{c}	8.277^{b}	8.773^{a}	8.906^{a}
**Feed cost and economical efficiency				
Cost of feed intake (LE/ head)	19.259	20.959	19.227	18.704
Price of milk yield (LE/ head)	49.560	51.024	53.070	54.168
Daily feed cost/ kg milk yield (LE)	2.332	2.465	2.174	2.072
Daily feed cost/ 4% FCM yield (LE)	2.421	2.532	2.192	2.100
Net revenue (LE)	30.301	30.065	33.843	35.464
Net revenue/ kg milk yield (LE)	3.668^{b}	3.535^{b}	3.826^{a}	3.928^{a}
Net revenue/ 4% FCM yield (LE)	3.810	3.632	3.858	3.982
Economical efficiency	1.57	1.43	1.76	1.90

***: a, b and c: Means in the same row with different superscripts are significantly (P<0.05) different.**

**** Based on the assumption that the price of one ton of berseem hay and rice straw was 1600 and 400 LE, respectively. The price of concentrate feed mixture sharing in ration A, B , C and D was 1790, 2000, 1765 and 1717, respectively, while the price of one kg milk was 6 LE.**

Rumen Parameters:

The pH, NH_3-N, VFA's, Total –N, Protein –N and NPN concentrations for rumen liquors of animals fed different experimental rations are shown in Table (7). It could be noticed that the differences in pH values, total VFA's and protein-N concentration among different rumen liquor of experimental animals were not significant, while differences in NH_3-N, Total –N and NPN concentrations were significant (P<0.05). The NH_3- N concentration of rumen liquor of animals fed ration D was significant (P<0.05) higher than those fed other rations. On the other hand, rumen liquor of animals fed ration A recorded significant (P<0.05) lower in total-N and NPN than those fed other rations.

The data obtained in Table (7) showed that the pH values were affected by level and source of both CP and carbohydrate as mentioned by Johnson and Soltan (1968). Also, VFA's concentrations in rumen liquor were affected by several factors such as DM digestibility, rate of absorption, rumen pH, transportation of the digesta from the rumen to the lower part of the digestive tract and microbial population in the rumen and their activities (Allam *et al.,* 1984). Moreover, increasing in total VFA's concentration might be due to increase digestibility of OM as reported by Arelovich *et al.* (2000) and Etman *et al.* (2011). On the other hand, the protein-N and NPN concentration reflected to total –N concentration. In addition, the fluctuation in pH values, NH3-N and VFA's concentrations might be attributed to ration composition, feeding type, feeding level, roughage to concentrate ratio and time sampling as reported by Etman *et al.* (2011).

Table 7. Average some rumen liquor parameters of animals fed different experimental rations

Items	Experimental rations			
	A	B	C	D
pH value	6.45	6.72	6.80	6.75
NH_3- N (mg/ 100ml)	11.20^b	12.45^b	12.74^b	14.58^a
VFA's (mleq/100ml)	11.74	11.98	12.20	12.42
Total –N (mg/ 100 ml)	152.16^b	160.04^a	158.16^a	162.18^a
Protein – N (mg/ 100ml)	98.72	100.12	98.98	102.20
NPN (mg/100 ml)	53.44^b	59.92^a	59.18^a	59.98^a

a and b: Means in the same row with different superscripts are significantly (P<0.05) different.

Some blood parameters:

The results obtained in Table (8) showed that the differences in blood total protein concentration of animals fed different experimental rations were not significant, showing somewhat higher concentration with animals fed ration D (containing DDGS), recording 6.96 versus 6.34, 6.52 and 6.54 gm/ 100 ml with animals fed rations A, B and C, respectively. On the other hand, the differences in the albumin and globulin concentrations showed higher (P<0.05) significant between animals fed ration D and those fed other rations, giving the highest concentration with ration D (containing DDGS). At the same time, the ratio between albumin and globulin among all different treatments were not significant. It could be noticed that higher concentration of total protein and its components such as albumin and globulin with animals fed ration D might be due to improve of nitrogen absorption (Kornegay *et al.* 1997) and increase CP digestibility (Yousef and Zaki, 2001). Data were agreement with those reported by Kumar *et al.* (1980) who found a positive correlation between level of protein in ration and serum protein concentration. Also, data were agreement with the finding of Etman *et al.* (2011) who reported that the concentration of total protein, albumin and globulin tended to increase with increasing DDGS level in rations. Data in Table (8) revealed that the difference in concentrations of AST and ALT as an indicator for liver function were significant (P<0.05), showing lower concentration with animals fed ration B than those fed others. However, Boots *et al.* (1969) reported that the GOT and GPT concentration depends on several factors such as: feeding practices, genetic control, response to stress, age, liver function and body weight. In this respect, results were agreement with those reported by Etman *et al.* (2011). On the contrary, the differences in concentration of blood creatinin and urea nitrogen as a kidney function were not significant. Also, the ratio between blood urea nitrogen and creatinin were not significant, as shown in Table (8).

Table 8. Average blood parameters of lactating Friesian cows fed different experimental rations.

Items	Experimental rations			
	A	B	C	D
Serum protein(gm/100ml):				
Total protein	6.34	6.52	6.54	6.96
Albumin (A)	4.02^b	4.05^b	4.08^b	4.25^a
Globulin (G)	2.32^b	2.47^b	2.46^b	2.71^a
A/G ratio	1.73	1.64	1.66	1.57
Liver function (IU/L):				
AST	44.86^a	43.14^b	44.75^a	44.62^a
ALT	24.52^a	23.18^b	24.96^a	24.15^a
Kidney function (mg/dL):				
Creatinine	1.18	1.22	1.24	1.20
BUN	16.24	16.84	17.40	17.45
BUN/ creatinin	13.76	13.80	14.03	14.54

AST: Aspartate Amino Transfers
BUN: Blood urea nitrogen
ALT: Alanin Amino Transfers.

In general, the previous parameter concentration were not affected by source of ration protein, and the data were similar with those reported by Lopez *et al.* (2010), Etman *et al.* (2010& 2011).

CONCLUSION

Generally, it could be concluded that, using DDGS with rate of 26% to cover 50% of total protein of concentrate feed mixture in lactating Friesian rations appeared to better digestibility and feeding value. Moreover, animals fed ration containing DDGS showed higher milk yield, giving the highest net revenue with the lowest feed cost and the best economical efficiency without any adverse effects on rumen or blood parameters.

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تأثير إستخدام النواتج العرضية لتقطير الحبوب المجففة بالسوائل كمصادر بروتينية جديدة على إنتاج وجودة اللحوم والألبان:

١- إستخدام منتجات تقطير الحبوب بدلاً من كسب القطن أو كسب فول الصويا في علائق الأبقار الفريزيان الحلابة

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يهدف هذا البحث إلى دراسة تأثير إستخدام منتجات تقطير الحبوب المجففة بالسوائل DDGS في علائق أبقار الفريزيان الحلابة على معاملات الهضم، القيمة الغذائية، إنتاج اللبن وكذلك الكفاءة الغذائية والإقتصادية، إستخدم عدد ٢٤ بقرة في موسم حليبها الثاني بمتوسط وزن ٣٨٣كجم وقسمت إلى أربعة مجموعات متماثلة (٦ في كل مجموعة) وغذيت على العلائق التجريبية التالية:العليقة التجريبية (A): علف مركز يحتوى على الثلاثة مصادر البروتينية المختبرة + مواد خشنة (مقارنة).العليقة التجريبية (B): علف مركز (يحتوى على كسب قطن مصدراً لـ ٥٠٪ من البروتين) + مواد خشنة. العليقة التجريبية (C): علف مركز (يحتوى على كسب صويا مصدراً لـ ٥٠٪ من البروتين) + مواد خشنة. العليقة التجريبية (D): علف مركز (يحتوى على منتجات تقطير الحبوب مصدراً لـ ٥٠٪ من البروتين) + مواد خشنة. علماً بأن العلف المركز يمثل ٦٠٪، والمواد الخشنة ٢٥٪ دريس برسيم +١٥٪ قش أرز وأستمرت التغذية لمدة ٢١٠ يوماً طبقاً لمقررات الـ NRC (1989) وتم تقدير كميات اللبن اليومي وتم أخذ عينات لبن وتحليلها لتقدير بعض القياسات كما تم إجراء أربعة تجارب هضم على الأبقار بطريقة الرماد الغير ذائب فى الحامض (AIA) لتقدير القيمة الهضمية والغذائية للعلائق التجريبية وكانت أهم النتائج المتحصل عليها كما يلي: أظهرت معاملات هضم المادة العضوية والبروتين الخام والدهن الخام والمستخلص الخالى من النتروجين للعليقة (D) إرتفاعاً معنوياً عند مستوى ٥% مقارنة بالعلائق الأخرى، إلا أن الفروق في معامل هضم كل من المادة الجافه والألياف الخام بين العليقة (D) والعليقة (C) كانت غير معنوية، بجانب ذلك أظهرت القيم الغذائية معبراً عنها بالمركبات الكلية المهضومة (TDN)، البروتين المهضوم (DCP)، والطاقة المهضومة (DE) والممثلة (ME) إرتفاعاً معنوياًمع العليقه (D) مقارنة بالعلائق الأخرى. أظهرت الحيوانات التي تغذت على العليقة (D) التي تحتوى على منتجات تقطير الحبوب كمصدر للبروتين زيادة معنوية في كل من اللبن الطبيعي (٩.٠٢٨كجم) واللبن معدل الدهن ٤% (٨.٩٠٦كجم) مع تحسن في نسب وكميات مكونات اللبن عن تلك التي تغذت على العليقتين الاولى (A) والثانية (B). كانت الكفاءة التحويلية معبراً عنها بكمية المادة الجافة المأكولة لكل كجم لبن طبيعي أو معدل الدهن ٤% أفضل مع المعاملة الغذائية (D) عن المعاملات الغذائية الأخرى، بينما كانت الأفضل مع المعاملة الغذائية (C) عند حسابها على أساس كمية المركبات الغذائية المهضومة لكل كجم لبن طبيعي أو معدل الدهن ٤٪. كانت العليقة (D) المحتوية على منتجات تقطير الأذرة هي الأرخص والأقل تكلفة لإنتاج واحد كيلو جرام لبن طبيعي (٢.٠٧٢ جنيهاً) أو لبن معدل الدهن ٤٪ (٢.١٠٠ جنيها)، كما أن الحيوانات التي تغذت على هذه العليقة كانت هي الأكثر ربحية (٣٥.٤٦٤ جنيهاً) والأفضل في الكفاءة الاقتصادية (١,٩٠). أظهرت كل قيم سائل الكرش وسيرم الدم إرتفاعاً بسيطاً في الحيوانات التي تغذت على العليقة (D) وكانت في نطاق القيم الطبيعية ولم تظهر أي آثار جانبية على الحيوانات. عموماً يمكن إستخدام منتجات تقطير الحبوب بنسبة ٢٦٪ ليغطي ٥٠٪ من بروتين العلف المركز لعلائق الأبقار الفريزيان الحلابة وهذه النسبة أدت إلى تحسن وزيادة في معاملات الهضم، القيمة الغذائية مع زيادة كمية اللبن الناتج – كما أن هذه النسبة أدت إلى إنخفاض تكاليف التغذية مع زيادة الربحية و إرتفاع الكفاءة الاقتصادية.