PROBIOTIC SUPPLEMENTATION FOR SUCKLING FRIESIAN CALVES 1- PRODUCTIVE PERFORMANCE

H. M. A. Gaafar, A. A. Shitta and E. A. Omer

Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Dokki, Giza, Egypt

(Received 3/12/2004, accepted 20/5/2005)

SUMMARY

Forty-eight suckling Friesian calves and heifers during winter (30 animals with average live weight of 32.70 ± 0.79 kg) and summer seasons (18 animals with average live weight of 36.35 ± 0.65 kg) were divided into three comparable groups based on sex and birth weight. In the control group (G1), animals were fed a basal ration consisted of whole milk, starter and fresh berseem (winter season) or berseem hay (summer season). While in the second (G2) and third groups (G3), animals were fed a basal ration supplemented with 5 and 10 g Bio-Top / calf / day in the whole milk once time daily during the morning suckling, respectively.

The obtained results showed that the digestibilities of DM, OM, CP, CF, EE and NFE and subsequently TDN, ME and DCP values were significantly higher ($P<0.05$) for groups supplemented with probiotic compared with control group and for winter than summer seasons. While, their were nearly similar for male and female calves.

Calves of G3 (10 g Bio-Top) recorded significantly ($P<0.05$) the highest intakes of TDN and ME followed by those in G2, while control group (G1) had the lowest intakes. There were no significant differences ($P>0.05$) in DM and DCP intakes among the different groups. The intakes of DM, TDN, ME and DCP were higher significantly ($P<0.05$) for winter compared with summer season. While, there were no significant differences ($P>0.05$) in DM, TDN, ME and DCP intakes between male and female calves.

Calves of G3 showed significantly ($P<0.05$) the lowest ruminal pH value and NH_3-N concentration and the highest TVFA's concentration, followed by G2, while control group had the opposite values. Moreover, the concentration of NH_3-N was higher significantly ($P<0.05$) for winter compared with summer season, while pH value tended to be lower and TVFA's concentration tended to be higher for winter compared with summer season. Ruminal pH value and TVFA's and NH_3-N concentrations were nearly similar for male and female calves.

Probiotic supplementation led to increasing body weight, daily weight gain and body weight gain improvement. Calves born in winter revealed significantly ($P<0.05$) the higher body weight at 10 and 15 weeks and daily weight gain during the periods of 1-5, 6-10 and 1-15 weeks of age. While calves born in summer season had significantly ($P<0.05$) the higher daily weight gain during the period of 11-15 weeks of age. Moreover, body weight of male calves was significantly ($P<0.05$) higher than female calves. While, there were no significant differences in daily weight gain between male and female calves.

Probiotic supplementation improved significantly feed and economic efficiencies. Feed and economic efficiencies were higher significantly for winter than summer season. While, there were no significant differences in feed and economic efficiencies between male and female calves.

Keywords: *Suckling Friesian calves, probiotic supplementation, body weight gain, feed and economic efficiencies.*

INTRODUCTION

In practice, feed additives are defined as feed ingredients of a nonnutritive nature which will stimulate growth or other types of performance or improve the efficiency of feed utilization or which may be beneficial in some manner to the health or

metabolism of the animal (AFCO, 1988). Feed additives are a most important part of modern-day animal production, especially in any situation where animals are housed in large numbers in limited spaces. Many of the additives used are classed as drugs, and all drugs used in animal production are under some degree of control by the food and drug administration, which must approve a feed additive for use before it can be used at the commercial level on a routine basis (Church, 1991).

Much attention has been recently paid to the use of the probiotic to maintain and degenerate the state of the resident microflora in animals and humans (Smirnov et al., 2002). Probiotics has been used in small amounts as a supplement in animal feeds for improving their performance (Dawson, 1995). Moreover, many of the beneficial productive responses associated with the use of probiotics supplements can be directly related to their effects on the microbial population in the digestive tract (McCormick, 1984; Nahshon et al., 1992 and Dawson, 1995). Probiotics regulate the microbial environment of the intestine, decrease digestive disturbances, inhibit pathogenic intestinal microorganisms and improve feed conversion efficiency and health performance of the utilization of nutrients by the host. This effect can be monitored by digestibility measurements (Roberton and Chevalier, 1997).

In case of young animals, the administration of bacteria used as a probiotic would be of great usefulness, probably because its antigenic stimulation would favour the maturation of the secretory immune system thus preventing infection (Perdigon and Alvarez, 1992). Lactobacillus species have been shown to produce digestive enzymes; amylase, protease and lipase, which may enrich the concentration of intestinal digestive enzymes (Moon and Kim, 1989 and Lee and Lee, 1990). Oral inoculation of animal with lactobacilli led to elevated levels of total serum proteins, globulin and increased white blood cells count (Pollmann et al., 1980).

Therefore, the present study was carried out to investigate the effect of Bio-Top as commercial probiotic product on productive performance of suckling Friesian calves.

MATERIALS AND METHODS

The current work was carried out at Sakha Animal Production Research Station, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture during year 2004.

Forty-eight suckling Friesian calves and heifers during winter (30 animals with average live weight of 32.70 $\pm$ 0.79 kg) and summer seasons (18 animals with average live weight of 36.35 $\pm$ 0.65 kg) were divided into three comparable groups based on gender and birth weight. In the control group (G1), animals were fed a basal ration consisted of whole milk, starter and fresh berseem (winter season) or berseem hay (summer season). While in the second (G2) and third groups (G3), animals were fed a basal ration supplemented with 5 and 10 g Bio-Top / calf / day in the whole milk once time daily during the morning suckling, respectively.

Calves were removed from their dams after having their colostrums for 3 days and artificially fed whole milk in plastic bucket twice daily at 7 a.m. and 5 p.m. during winter season and at 7 a.m. and 7 p.m. during summer season. From the beginning of the third week, calves were given the starter once daily at 9 a.m. and fresh berseem or berseem hay once time at 11 a.m. Commercial probiotic (Bio-Top) was supplemented in the whole milk once time daily during the morning suckling. Water was available in build

basin for calves all the day round. Calves were fed according to the recommended requirements of Animal Production Research Institute (1997) as shown in Table (1). Chemical composition of tested feedstuffs used during the first and second experiments are presented in Table (2).

Starter consisted of 15% Soya bean meal, 10% linseed cake, 34% ground corn grain, 20% wheat bran, 15% rice bran, 3% molasses, 2% limestone and 1% common salt. Bio-Top additive was composited of $4X10^{10}$ CFU Bacillus Licheniformis CH200, $4X10^{10}$ CFU Bacillus Subtilis CH201, 20 gm Zinc oxide and 980 gm wheat bran (carrier) per 1 kg basis.

Two digestibility trials were conducted for the winter and summer seasons at week 10 of age using 6 calves from each group (3 males and 3 females) to determine nutrients digestibility coefficients and nutritive values using acid insoluble ash as a natural marker (Van Keulen and Young, 1977). Each digestibility trial consisted of 15 days as a preliminary period followed by 7 days collection period. Feces samples were taken from the rectum of each calf twice daily with 12 hours interval during the collection period. Samples of whole milk, starter, fresh berseem and berseem hay were taken at the beginning, middle and end of collection period. The samples of starter, fresh berseem, berseem hay and feces were composted and representative samples were dried in a forced air oven at 65 ^{0}C for 48 hours, ground and analyzed according to AOAC (1990). Whole milk samples were analyzed using Milko-Scan (133 B. Foss Electric).

Rumen liquor sample for the winter and summer seasons were collected at three hours after the morning feeding from the calves used in the digestibility trials using stomach tube and filtered through double layers of cheese cloth. Ruminal pH value was immediately estimated using Orian 680 digital pH meter. The concentration of ammonia-N was determined using saturated solution of magnesium oxide distillation according to the method of AOAC (1990). The concentration of TVFA's was determined in the rumen liquor by the steam distillation method according to Warner (1964).

Calves were weighed weekly in the morning before drinking and feeding to the nearest 0.1 kg for each animal during the suckling period and average daily body weight gain were calculated. Feed efficiency was calculated as the amounts of DM, TDN, ME and DCP per kg body weight gain. The value of ME was calculated from the equations stated by NRC (1988) as follows:

DE (Mcal / kg DM) = 0.04409 x TDN (%)

ME (Mcal / kg DM) = - 0.45 + 1.01 DE

Economic efficiency was calculated as the ratio between the income of the average daily body weight gain and the cost of average daily feed cost as follows:

$$\text{Economic efficiency} = \frac{\text{Output of daily weight gain}}{\text{Cost of daily feed consumed}}$$

Where the price of 1 kg whole milk was 1.50 LE, 1.20 LE for starter, 0.10 LE for fresh berseem, 0.60 LE for berseem hay and 15.00 LE for body weight gain throughout year 2004.

The data were subjected to statistical analysis using general linear model procedure adapted by SPSS (1999) for user's guide with ony-way ANOVA. Also, Duncan's test within program of SPSS was done to determine the degree of significance between the means.

Table (1): Average daily feedstuffs intake (kg/ head) during suckling period.

Feedstuffs*	Age (week)							
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15
Whole milk	3.5-4.0	4.5-5.0	5-4.5	4-3.5	3-2.5	2-1.75	1.5-1.25	1
Starter	-	0.25	0.50	0.75	1.00	1.25	1.50	1.75
Fresh berseem	-	1.00	1.50	2.00	2.50	3.00	3.50	4.00
Berseem hay	-	0.10	0.20	0.30	0.40	0.50	0.60	0.70

* as fed.

Table (2): Chemical composition of tested feedstuffs for winter and summer seasons.

Items	DM%	Composition of DM %					
		OM	CP	CF	EE	NFE	Ash
Winter season							
Whole milk	12.40	94.55	25.65	00.00	30.25	38.65	5.45
Starter	90.25	92.20	18.15	5.85	3.25	64.95	7.80
Fresh berseem	16.30	89.10	15.95	24.30	2.90	45.95	10.90
Summer season							
Whole milk	11.80	93.80	23.95	00.00	29.30	40.55	6.20
Starter	91.45	91.75	17.90	5.95	3.35	64.55	8.25
Berseem hay	88.65	90.75	12.50	27.35	2.40	48.50	9.25

Table (3): Effect of probiotic supplementation, season and gender on nutrients digestibility coefficients and nutritive values of the experimental rations by suckling Friesian calves.

Items	Digestibility coefficients %						Nutritive values		
	DM	OM	CP	CF	EE	NFE	TDN %	ME*	DCP %
Treatments									
G1 (control)	72.02^{b}	73.92^{b}	71.30^{b}	55.44^{b}	79.40^{b}	75.70^{c}	75.25^{b}	2.90^{b}	13.14^{b}
G2 (5 g Bio-Top)	73.85^{a}	75.27^{a}	72.59^{a}	57.87^{a}	80.20^{ab}	77.47^{b}	76.84^{a}	2.97^{a}	13.38^{ab}
G3 (10 g Bio-Top)	74.16^{a}	75.43a	73.49^{a}	58.29^{a}	80.91^{a}	78.98^{a}	77.99^{a}	3.02^{a}	13.55^{a}
Season									
Winter	74.80^{a}	76.37^{a}	73.88^{a}	58.32^{a}	81.74^{a}	78.90^{a}	78.35^{a}	3.04^{a}	14.06^{a}
Summer	71.89^{b}	73.38^{b}	71.04^{b}	56.09^{b}	78.60^{b}	75.87^{b}	75.04^{b}	2.89^{b}	12.66^{b}
Gender									
Male	73.68	75.14	72.74	57.45	80.52	77.78	76.98	2.98	13.46
Female	73.01	74.61	72.18	56.95	79.82	76.98	76.41	2.95	13.25

* Meal / kg DM.

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

RESULTS AND DISCUSSION

Nutrients digestibility coefficients and nutritive values are shown in Table (3). The digestibilities of DM, OM, CP, CF, EE and NFE and subsequently TDN, ME and DCP values were significantly higher ($P<0.05$) for groups supplemented with probiotic (Bio-Top) compared with control group (without Bio-Top supplementation). The beneficial productive responses associated with the use of probiotics supplements can be directly related to their effects on the microbial population in the digestive tract. These results are in accordance with those obtained by McCormick (1984), Nahshon et al. (1992) and Dawson (1995).

Moreover, the nutrients digestibility coefficients and nutritive values were significantly ($P<0.05$) higher winter season than summer season. These results may be attributed to feeding fresh berseem during winter season and berseem hay during summer season. However, there were no significant differences ($P>0.05$) in nutrients digestibility coefficients and nutritive values between male and female calves. These results are in accordance with those obtained by Gaafar et al. (2004) who found that nutrients digestion coefficients and nutritive values by suckling Friesian calves were significantly higher for ration contained fresh berseem compared with ration contained berseem hay as a roughage for suckling calves. Church (1991) reported that as plant matures the protein and readily available carbohydrates contents decreases, while structural carbohydrates along with lignin increases and digestibility of both protein and energy decreases.

Results in Table (4) revealed that calves of G3 (10 g Bio-Top) recorded significantly ($P<0.05$) the highest intakes of TDN and ME followed by those of G2, while control group (G1) had the lowest intakes. While, there were no significant differences ($P>0.05$) in DM and DCP intakes among the different groups. Moreover, the intakes of DM, TDN, ME and DCP were higher significantly ($P<0.05$) for winter compared with summer season. However, there were no significant differences ($P>0.05$) in DM, TDN, ME and DCP intakes between male and female calves. These results are in harmony with those obtained by Abou'l Ella et al. (2003) who found that Bio-Top supplementation led to a significant increase in DM intake by ewes. Gaafar et al. (2004) stated that the intake of DM, TDN and DCP by suckling Friesian calves were higher for winter season compared with summer season. Also, the last author found that feed intake was nearly similar for male and female suckling Friesian calves.

Rumen liquor parameters of male and female suckling Friesian calves fed probiotic supplementation during winter and summer seasons are shown in Table (5). Calves of G3 showed significantly ($P<0.05$) the lowest ruminal pH value and NH_3-N concentration and the highest TVFA's concentration, followed by G2, while control group had the opposite values. Moreover, the concentration of NH_3-N was higher significantly ($P<0.05$) for winter compared with summer season, while pH value tended to be lower and TVFA's concentration tended to be higher for winter compared with summer season. Ruminal pH value and TVFA's and NH_3-N concentrations were nearly similar for male and female calves. These results are in accordance with those obtained by Hungate (1966) demonstrated that rumen microorganisms utilize more NH_3-N when more energy source is fermented. Russell and Dombrowski (1980) reported that

ruminal VFA production was closely related to ruminal pH, which can be considered an important regulator of microbial yield. Putnam and Schwab (1994) stated that indicated that lower concentrations of ammonia in the rumen might be a result of increased ammonia utilization into microbial protein.

Data of body weight and daily weight gain of suckling Friesian calves fed probiotic (Bio-Top) supplementation for winter and summer seasons are presented in Table (6). Probiotic supplementation led to significant increase in body weight, daily weight gain and weight gain improvement. Calves of G3 recorded significantly ($P<0.05$) the highest body weight, daily weight gain and body weight gain improvement followed by those of G2, while calves of control group had the lowest values. Average daily weight gain during the whole suckling period for groups 2 and 3 supplemented with 5 and 10 g Bio-Top / day increased by 10.91 and 12.73 % compared with control group, respectively. These results may be attributed to that Bio-Top supplementation increased microbial count in the rumen, which led to improvements of nutrients digestion and subsequently increasing nutritive values and rumen activities (Tables 3&5). Also, due to increasing TDN, ME and DCP intake with Bio-Top supplementation (Table 4). Similar results were obtained by Abe et al. (1995) stated that probiotics had useful effects, including improved body weight gain of newborn calves. Zinc that is the component of Bio-Top was required for the growth of the microorganisms in the rumen as stated by McDowell (1992).

In spite of the lower birth weight of calves born in winter, it revealed significantly ($P<0.05$) the higher body weight at 10 and 15 weeks and daily weight gain during the periods of 1-5, 6-10 and 1-15 weeks of age compared with calves born in summer season (Table 6). While calves born in summer season had significantly ($P<0.05$) the higher daily weight gain during the period of 11-15 weeks of age compared with those born in winter season. Body weight gain of calves born in winter season improved by 14.81% compared with those born in summer season. These results may be attributed to the higher intake of DM, TDN, ME and DCP for winter than summer season (Table 4) and also to the temperature stress of summer season. Moreover, male calves had significantly ($P<0.05$) the higher body weight at birth, 5, 10 and 15 weeks of age compared with female calves. While, there were no significant differences in daily weight gain between male and female calves. These results are in agreement with those obtained by Yousef et al. (1997) and Gaafar et al. (2004) who indicated that although birth weight was lower for winter season, weaning weight and daily weight gain were higher compared with summer season. Gaertner et al. (1992) found that sex of calf was significant factor affecting weaning weight.

Results in Table (7) showed that Bio-Top supplementation improved feed efficiency, since the amounts of DM, TDN, ME and DCP required to produce 1 kg gain for groups supplemented with Bio-Top were significantly lower ($P<0.05$) than the control group. However, there were no significant differences ($P>0.05$) between calves supplemented with 5 or 10 g Bio-Top. These results are in accordance with those obtained by Abe et al. (1995) who stated that the probiotics had useful effects, including improved feed efficiency of newborn calves. Roberton and Chevalier (1997) and Homma and Hamaoka (1998) found that probiotics supplementation improved feed conversion efficiency. Brashears et al.

Table (4): Effect of probiotic supplementation, season and gender on average daily feed intake by suckling Friesian.

Items	Whole milk (kg)	Starter (kg)	Fresh berseem (kg)	Berseem hay (kg)	Bio-Top (g)	DM kg	TDN kg	ME Mcal	DCP g
Treatments									
G1 (control)	3.03	0.82	1.29	0.12	0	1.43	1.08[b]	4.18[b]	190.97
G2 (5 g Bio-Top)	3.03	0.82	1.29	0.12	5	1.44	1.11[ab]	4.30[ab]	195.22
G3 (10 g Bio-Top)	3.03	0.82	1.29	0.12	10	1.44	1.13[a]	4.39[a]	198.30
Season									
Winter	3.03	0.82	2.07	-	5	1.46[a]	1.14[a]	4.43[a]	205.03[a]
Summer	3.03	0.82	-	0.33	5	1.40[b]	1.05[b]	4.06[b]	177.83[b]
Gender									
Male	3.03	0.82	1.29	0.12	5	1.44	1.11	4.31	196.38
Female	3.03	0.82	1.29	0.12	5	1.44	1.10	4.27	193.27

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

Table (5): Effect of probiotic supplementation, season and gender on rumen liquor parameters of sucking Friesian calves.

Items	pH	TVFA's (meq/ 100 ml)	NH_3-N (mg/ 100 ml)
Treatments			
G1 (control)	6.58[a]	8.52[c]	9.02[a]
G2 (5 g Bio-Top)	6.41[b]	9.57[b]	8.75[b]
G3 (10 g Bio-Top)	6.26[c]	10.11[a]	8.56[c]
Season			
Winter	6.38	9.61	8.97[a]
Summer	6.46	9.20	8.59[b]
Gender			
Male	6.45	9.44	8.82
Female	6.38	9.36	8.74

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

Table (6): Effect of probiotic supplementation, season and gender on body weight and daily weight gain of suckling Friesian calves.

Items	No. of animals	Body weight (kg)				Daily weight gain (kg)				Weight gain improvement
		Birth	5 weeks	10 weeks	15 weeks	1-5 weeks	6-10wks	11-15wks	1-15wks	
Treatments										
G1 (control)	16	34.07	46.03^{b}	64.87^{b}	91.42^{b}	0.34^{b}	0.54^{b}	.76^{c}	0.55^{b}	100.00^{b}
G2 (5 g Bio-Top)	16	34.07	46.89^{ab}	68.66^{a}	97.72^{a}	0.37^{ab}	0.62^{a}	0.83^{b}	0.61^{a}	110.91^{a}
G3 (10 g Bio-Top)	16	34.07	47.69^{a}	68.75^{a}	99.17^{a}	0.39^{a}	0.60^{a}	0.87^{a}	0.62^{a}	112.73^{a}
Season										
Winter	30	32.70^{b}	46.67	70.40^{a}	98.15^{a}	0.40^{a}	0.68^{a}	0.79^{b}	0.62^{a}	114.81^{a}
Summer	18	36.35^{a}	47.21	62.48^{b}	92.70^{b}	0.31^{b}	0.44^{b}	0.86^{a}	0.54^{b}	100.00^{b}
Gender										
Male	24	35.33^{a}	48.12^{a}	68.77^{a}	97.24^{a}	0.36	0.59	0.81	0.59	100
Female	24	32.81^{b}	45.61^{b}	66.09^{b}	94.97^{b}	0.36	0.58	0.82	0.59	100

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

Table (7): Effect of probiotic supplementation, season and gender on feed and economic efficiencies of suckling Friesian calves.

Items	Feed efficiency				Economic efficiency			
	DM Kg / kg gain	TDN Kg / kg gain	ME Mcal/kg gain	DCP g / kg gain	Daily feed cost (LE)	Price of daily gain (LE)	Feed cost (LE)/kg gain	Economic efficiency
Treatments								
G1 (control)	2.64^{a}	1.99^{a}	7.68^{a}	349.96^{a}	5.73^{b}	8.19^{b}	10.56^{a}	1.43^{b}
G2 (5 g Bio-Top)	2.38^{b}	1.84^{b}	7.11^{b}	322.12^{b}	5.83^{ab}	9.09^{a}	9.67^{b}	1.56^{a}
G3 (10 g Bio-Top)	2.33^{b}	1.83^{b}	7.09^{b}	319.79^{b}	5.93^{a}	9.30^{a}	9.61^{b}	1.57^{a}
Season								
Winter	2.34^{b}	1.84^{b}	7.12^{b}	32952	5.84	9.35^{a}	9.38^{b}	1.60^{a}
Summer	2.63^{a}	1.97^{a}	7.59^{a}	332.41	5.83	8.05^{b}	10.89^{a}	1.38^{b}
Gender								
Male	2.45	1.90	7.34	333.85	5.83	8.88	9.96	1.52
Female	2.45	1.88	7.25	327.36	5.83	8.88	9.96	1.52

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

(2003) reported that gain / feed ratios tended to be better for animals receiving the probiotics treatments than for control animals.

Moreover, feed efficiency of winter was higher significantly (P<0.05) than summer season, since the amounts of of DM, TDN, ME and DCP required to produce 1 kg gain were lower significantly (P<0.05) for winter than summer season (Table 7). Moreover, there were no significant (P>0.05) differences in feed efficiency between male and female calves. These results agreed with those obtained by Salama and Mohy El-Deen (1997) and Gaafar et al. (2004) who reported that feed efficiency was higher for winter than summer born calves, while feed efficiency were nearly similar for male and female suckling Friesian calves.

Bio-Top supplementation reduced feed cost per kg gain and enhanced the price of daily weight gain and subsequently economic efficiency (P<0.05) as shown in Table (7). Moreover, feed cost per kg gain was lower significantly (P<0.05) and price of daily weight gain and economic efficiency were higher significantly (P<0.05) for winter compared with summer season. While, there were no significant (P>0.05) differences in economic efficiency between male and female calves. These results are illustrated with those obtained by Honaramooz et al. (1999) and Gaafar et al. (2004) who indicated that the average cost of 1 kg gain of Friesian calves was higher and subsequently economic efficiency was lower in summer than winter season. Also, the later author stated that economic efficiency were nearly similar for male and female suckling Friesian calves.

From these results it could be concluded that commercial probiotic (Bio-Top) supplementation enhancement body weight gain, feed and economic efficiencies of suckling Friesian calves. The calves born in winter season had the best results compared with those born in summer season.

REFERENCES

Abe, F.; N. Ishibashi and S. Shimamura (1995). Effect of administration of bifidobacteria and lactic acid bacteria to newborn calves and piglets. J. Dairy Sci., 78: 2838.

Abou'l Ella, A. A.; A. N. Sayed; S. G. Abdo and M. M. Khorshed (2003). Effect of commercial probiotic supplementation on the productive performance of lactating ewes. Egyptian J. Nutrition and Feeds, 6 (Special Issue): 1023.

AFCO (1988). Association American Feed Official. Official Publication. Washington, D.C.

Animal Production Research Institute (1997). Animal Nutrition Scientifically and Practically. 1st Ed. Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Dokki, Giza, Egypt (In Arabic).

AOAC (1990). Association of Official Analytical Chemists. Official Methods of Analysis, 15th Ed., Washington, DC.

Brashears, M. M.; M. L. Galyean; G. H. Loneragan; J. E. Mann and K. Killinger-Mann (2003). Prevalence of Escherichia coli O157:H7 and performance by beef feedlot cattle given Lactobacillus direct-fed microbials. J. Food Prot., 66: 748.

Church, D. D. (1991). Livestock Feeds and Feeding. 3rd Ed. Prentic Hall INC. Englewood Cliffs, New Jersy.

Dawson, K. A. (1995). Current and future role of yeast culture in animal production: A review of research over

the last seven years. Dept. of Anim. Sci. Book, pp 269.

Gaafar, H. M. A.; A. A. Shitta and S. A. Ibrahim (2004). Some factors affecting on productive performance of suckling Friesian calves. Egypt J. Basic and Appl. Physiol., 3: 273.

Gaertner, S. J.; F. M. Rouquette; C. R. Long and J. W. Turner (1992). Influence of calving season and stocking rate on birth and weaning weight of Simmental-sired calves from Brahman-Hereford F1 dams. J. Anim. Sci., 70: 2296.

Homma, H. and T. Hamaoka (1998). Effect of commercial probiotics on the performance and some serum components in the Japanese quail. Proc. 8th World Conf. on Animal Production, Seoul National Univ., Seoul, Korea, 1: 794.

Honaramooz, A.; R. K. Chandolia; A. P. Beard and N. C. Rawlings (1999). Effects of season of birth on the prepubertal pattern of gonadotropin secretion and age at puberty in beef heifers. Theriogenology, 52: 67.

Hungate, R. E. (1966). The Rumen and its Microbes. Academic Press. New York and London.

Lee, S. Y. and B. H. Lee (1990). Esterolytic and lipolytic activities of lactobacillus casei-subsp-casei LLG. J. Food Sci., 55: 119.

McCormick, M. E. (1984). Probiotic in ruminant nutrition and health. Proc. Gorgia Nutr. Conf. Feed Ind., pp 62.

McDowell, L. R. (1992). Minerals in Animal and Human Nutrition. Academic Press, INC, New York.

Moon, Y. I. and Y. K. Kim (1989). Study on the proteolytic action of intracellular protease of lactobacillus bulgaricus. Korean J. Dairy Sci., 11: 34.

Nahshon, S. N.; H. S. Nakaue and L. W. Mirosh (1992). Effect of direct fed microbials on nutrient retention and production parameters of lying pullets. Poultry Sci., 71: 11.

NRC (1988). Nutrient Requirement of Dairy Cattle. 6th Ed., National Academy Press, Washington, D.C.

Patnam, D. E. and C. G. Schwab (1994). Mode of action of yeast culture. J, Anim. Sci., 72: 2.

Perdigon, G. and S. Alvarez (1992). Probiotics and the immune status. In Probiotics, Roy Fuller, Chapman & Hall. pp 146.

Pollmann, D. S.; D. M. Danielson and E. R. Peo (1980). Effects of microbial feed additives on performance of starter and growing finishing pigs. J. Anim. Sci., 51: 577.

Roberton, J. L. and S. Chevalier (1997). Probiotics in pigeons and poultry nutrition. ESVIM Conf., France.

Russell, J. B. and D. B. Dombrowski (1980). Effect of pH on the efficiency of growth by pure culture of ruminal bacteria in continuous culture. Apple. Environs. Microbial., 39: 604.

Salama, M. A. M. and M. M. Mohy El-Deen (1997). Season of calving and its effect on birth weight and growth of buffalo calves reared in pens or hutches. Annals of Agric. Sci., Moshtohor, 35: 809.

Smirnov, V. V.; N. K. Kolvalenko; V. S. Podgorskii and I. B. Sorokulova (2002). Probiotic based on live culture of microorganisms. Mikrobiol Z., 64: 62.

SPSS for Windows (1999). Statistical package for the social sciences. Release 10, SPSS Inc.,Chicago, USA.

Van Keulen, J. and B. A. Young (1977). Evaluation of acid insoluble ash as a digestibility studies. J. Anim. Sci., 44: 282.

Warner, A. C. I. (1964). Production of volatile fatty acids in the rumen, method of measurements. Nutr. Abstr. And Rev., 34: 339.

Yousef, H. M.; A. A. Habeeb and H. El-Kousey (1997). Body weight gain and physiological changes in Friesian calves protected with wood or reinforced concrete sheds during hot summer season of Egypt. Egyptian J. Anim. Prod., 34: 89.

إضافة منشطات النمو الحيوية للعجول الفريزيان الرضيعة ١- الأداء الإنتاجى

حامد محمد عبدالمجيد جعفر، عبدالستار عبدالعزيز شتا، الشافعى عبدالقادر عمر

معهد بحوث الإنتاج الحيوانى، مركز البحوث الزراعية، وزارة الزراعة الدقى، الجيزة

استخدم ٤٥ عجل وعجلة فريزيان رضيعة خلال فصل الشتاء (٣٠ حيوان متوسط وزنهـا ٣٢,٧٠ ± ٠,٧٩ كجم) وفصل الصيف (١٨ حيوان متوسط وزنها ٣٦,٣٥ ± ٠,٦٥ كجم) قسمت إلى ثلاثة مجموعات طبقا للجنس و وزن الميلاد. غذيت حيوانات مجموعة المقارنة (ج١) على العليقة الأساسية المكونة من اللبن و العلف البادئ و البرسيم الطازج (فصل الشتاء) أو دريس البرسيم (فصل الصيف). بينما غذيت حيوانات المجموعتين الثانيـة (ج٢) والثالثة (ج٣) على العليقة الأساسية مع إضافة ٥ و ١٠ جم بيو-توب / عجل / يوم مرة واحدة يوميا فـى لبن الرضاعة الصباحية على التوالى.

توضح النتائج ارتفاع معاملات هضم المادة الجافة والمادة العضوية والبروتين والألياف والمستخلص الأثيري والمستخلص الخالى من الأزوت وبالتالى محتوى المركبات الغذائية المهضومة والطاقـة الممثلـة والبـروتين المهضوم معنويا (على مستوى ٠,٠٥) فى المجموعتين المضاف إليهما منشطات النمو الحيوية مقارنة بمجموعة المقارنة وفى فصل الشتاء عن الصيف. بينما لا توجد اختلافات فى معاملات الهضم والقيم الغذائية بين الـذكور والاناث.

أظهرت المجموعة الثالثة المضاف إليها (١٠ جم بيو-توب) معنويا (على مستوى ٠,٠٥) أعلى مأكول مـن المركبات الغذائية المهضومة والطاقة الممثلة تليها المجموعة الثانية (المضاف اليها ٥ جم بيـو-تـوب) بينمـا أظهرت مجموعة المقارنة أقل كميات مأكولة. بينما لا توجد اختلافات معنوية بين المجموعات فى المأكول من المادة الجافة والبروتين المهضوم. كذلك ارتفاع المأكول من المادة الجافة والمركبات الغذائية المهضومة والطاقة الممثلة والبروتين المهضوم معنويا فى فصل الشتاء مقارنة بالصيف. فضلا عن ذلك لا توجد اختلافات معنويـة فى المأكول من المادة الجافة والمركبات الغذائية المهضومة والطاقة الممثلة والبروتين المهضوم بـين الـذكور والاناث.

أدت إضافة منشطات النمو الحيوية الى انخفاض درجة الحموضة وتركيز نيتروجين الأمونيا وارتفاع تركيز الأحماض الدهنية الطيارة الكلية معنويا فى سائل الكرش. ارتفاع تركيز نيتروجين الأمونيا فى سـائل الكـرش معنويا فى فصل الشتاء عن الصيف بينما درجة حموضة الكرش و تركيز الأحماض الدهنية الطيارة الكلية متماثل تقريبا لفصلى الشتاء والصيف. كذلك لا توجد اختلافات معنوية فى نشاط الكرش بين الذكور والاناث.

أدت اضافة منشطات النمو الحيوية الى زيادة وزن الجسم ومعدل النمو اليومى و التحسن فى معدل النمـو. سجلت العجول المولودة خلال فصل الشتاء معنويا وزن مرتفع عند ١٠، ١٥ أسبوع و كذلك معدل نمو مرتفـع خلال الفترات من ١-٥، ٦-١٠، ١٠-١٥ أسبوع. بينما حققت العجول المولودة فى فصل الصـيف معنويـا وزن ميلاد مرتفع ومعدل نمو مرتفع خلال الفترة ١١-١٥ أسبوع. بالرغم من ارتفاع وزن الجسم معنويا فى الـذكور عن الإناث إلا أنه لا توجد اختلافات معنوية فى معدل النمو اليومى بينهما.

أدت إضافة منشطات النمو الحيوية إلى تحسن معنوى فى الكفاءة الغذائية والاقتصادية. كذلك ارتفاع الكفاءة الغذائية والاقتصادية معنويا للعجول المولودة خلال فصل الشتاء مقارنة بتلك المولودة خلال فصل الصيف. بينما لا توجد اختلافات معنوية فى الكفاءة الغذائية والاقتصادية بين الذكور والاناث.

نستخلص من هذه الدراسة أن إضافة منشطات النمو الحيوية للعجول الرضيعة أدت إلى زيادة وزن الفطـام ومعدل النمو اليومى و تحسن الكفاءة الغذائية والاقتصادية. كذلك ارتفاع وزن الفطام و معدل النمو اليومى والكفاءة الغذائية والاقتصادية للعجول المولودة خلال فصل الشتاء عن الصيف بينما لا توجد اختلافات معنوية بين الذكور والاناث.