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COMPARATIVE STUDY ON THE EFFECT OF PRONIFER SUPPLEMENT ON PERFORMANCE OF SUCKLING HOLSTEIN AND BUFFALO CALVES.

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ABSTRACT

Effect of dietary Pronifer supplement on feed intake, nutrient digestibility coefficients, some blood serum parameters, growth performance and economic and feed efficiencies of Holstein and buffalo calves was studied during suckling period.
A total of 80 calves (40 Holstein and 40 buffalo calves) were assigned in to two similar groups for each species, 20 in each. Calves in the control groups of both species were fed non- supplemented Holstein milk with calf starter and berseem hay (BH). In the second ones, calves were fed whole cow milk supplemented with 1 g Pronifer/ liter of milk with calf starter and BH. Results showed that, feed intake from milk, starter and BH and total feed intake as DM, TDN and DCP were significantly ($P<0.01$) higher in buffalo than Holstein calves, however, these parameters were not affected significantly by Pronifer supplementation. Digestibility coefficients of DM, CP, CF and EE were significantly ($P<0.05$) higher in Holstein than buffalo calves. Only, digestibility coefficients of DM and CF were significantly ($P<0.05$) higher in calves fed the supplemented diets than the control calves in both species, while digestibility coefficients of NFE did not differ significantly as affected by species, Pronifer supplementation and their interaction. Concentrations of urea in blood plasma were significantly ($P<0.05$) higher by about 7.8%, while total protein and calcium concentrations were significantly ($P<0.05$) lower by about 3.3 and 13.8% respectively, in Holstein than buffalo calves. Concentration of total protein, albumin and globulin improved ($P<0.05$) by about 11.5, 11.3 and 11.8% respectively, and cholesterol decreased ($P<0.05$) by about 8.5% in the supplemented than the control groups of both species. Averages of final body weight, total weight gain and daily gain were not affected significantly by species, but they were affected significantly ($P<0.05$) by Pronifer supplementation, being higher in the supplemented calves than the control calves. Final weight, total gain and average daily gain were significantly ($P<0.05$) higher in calves fed the supplemented diets than the control groups of both species. Also, total feed cost/kg gain decreased by about 5.3% in Holstein than buffalo calves and by about 11.6% in calves fed the supplemented than the control diets. Based on the forgoing results, it could be concluded that feeding suckling calves on diet supplemented with Pronifer has beneficial effects on their growth performance, digestibility coefficients, blood parameters and economic and feed efficiencies.
Keywords: Suckling calves, Pronifer, digestibility, blood parameters, feed efficiency.

INTRODUCTION

It has been reported that yeast culture increases the efficiency of energy utilization and improves metabolic process (El-Nor and Kholif, *1998;* Abdel-Khalek *et al.* 2000 and El-Ashry *et al.*, 2001), and increases flow of bacterial nitrogen to the small intestine (Erasmus *et al.*, 1992), which stimulate protein synthesis in growing animals.

Pronifer as a probiotic added in small amounts to ruminant diets was found to improve animal performance (Dawson, 1995) in terms of increasing live body weight gain, and reducing diarrhea incidence (Bohn and Srour,

1995) and improves performance of buffalo calves during different stages of growth and fattening (El-Basiony *et al.* 2001).

No available data were reported on the effect of Pronifer on performance of ruminants during the suckling period. Therefore, the current work was carried out to compare between Holstein and buffalo calves in regard to the effects of dietary supplementation of Pronifer on growth performance, digestibility coefficients, some blood parameters, and feed and economic efficiencies of suckling calves.

MATERIALS AND METHODS

Animals and feeding system:

This study was carried out at Al-Mgaz station for Holstein calves and Adah station for buffalo calves, Kafr El-Shiekh governorate. A total of 80 newly born calves (40 Holstein and 40 buffalo calves) was divided into two similar groups (control and treated) 20 calves (11 males and 9 females) in each according to their birth weights, for each species.

After birth, calves were left to suckle colostrum from their dams for 1-3 days, and then they were artificially fed fresh whole milk. At the beginning of the 2^{nd} wk of age, calves in the treated groups were fed on fresh whole milk supplemented with 1 g Pronifer/liter milk. While the control calves were fed on unsupplemented milk. Calves were weaned at about 91 kg LBW for Holstein calves and about 98 kg for buffalo calves.

Feed additives:

Pronifer is a mixed microbial supplement containing: (a) Viable lactic acid bacteria (approximately 10^6 CFU/g) from *Lactobacillus planetarium, L. brevis, L. fermeritum, L. casei* and *Pediococcus acidilacticii.* (b) Lactic acid fermentation metabolites and enzymes (organic acids, glucosidase, and peptidase). (c) Free amino acids and short chain peptides. Fresh milk was given to calves twice daily (8 a.m. and 15 p.m.) and solid feeds (calf starter and BH) were offered once daily.

Calf starter was composed of decorticated cotton seed cake, 25%; yellow corn, 32%; sunflower meal, 5%; wheat bran, 22%, rice bran, 8%; limestone, 2%; common salt, 1%; molasses, 4% and vitamins AD_3E, 1%.

Chemical compositions of feedstuffs used in calves feeding are presented in Table (1).

Table (1): Chemical analysis of different feedstuffs (on DM basis).

Feed stuff	DM%	Chemical composition (%)					Nutritive value (%)	
		CP	CF	EE	NFE	Ash	TDN	DCP
Milk	13.00	25.39	-	33.85	35.38	5.38	17.20	3.10
Starter	90.62	21.08	7.58	4.08	58.65	8.61	66.36	14.88
BH	89.20	13.62	27.63	3.03	42.60	13.12	46.10	6.90
Pronifer	89.00	48.31	-	0.90	44.05	6.74	-	-

Experimental procedures:

Individual live body weights (LBW) were weekly recorded and the average daily gain (ADG) was calculated. Blood samples were taken from the jagular vein into heparinized test tubes at weaning age before morning feeding.

Blood serum was separated from the major part of blood samples immediately after collection by centrifugation at 4000 rpm for 15 min. and kept frozen at -20°C for later analyses.

Chemical analysis of feeds and feces were determined according to A.O.A.C. (1984), however milk composition was determined using milko-scan.

Concentrations of serum total protein, albumin, cholesterol, urea, calcium and inorganic phosphorus in blood serum were determined using commercial kits (Pasteur Lab. Egypt-USA). Concentration of globulin was computed by subtracting albumin from total protein. In addition, economic and feed efficiencies were performed at the end of the experiment.

Digestibility trials:

At weaning age, digestion trials were conducted by using individual metabolic cages and four calves from each group for each species. Fecal were quantitively collected from each calf per day for 5 days to determine digestibility coefficients of nutrients of calves of each group.

Statistical analysis:

The statistical analysis was performed as a 2x2 factorial design (2 species and 2 groups) using the least square means described by Likelihood programme of SAS (1990). The significance of group differences were carried out according to Duncan's Multiple Range Test (1955).

RESULTS AND DISCUSSION

Feed intake:

Average daily intakes of different feedstuffs offered to each calf are presented in Table (2).

Table 2: Average daily amount of feedstuffs offered to each calf.

Age (wk)	Feedstuff		
	Milk (L.)	Starter (g.)	BH (g.)
1-3 days	Colostrum	-	-
4-7 days	4	-	-
2		100	150
3	5	150	
4		200	
5		300	
6	4	400	250
7		500	
8		600	
9		800	
10	3	1000	500
11		1100	
12	2	1200	
13		1300	
14	1	1400	
15		1500	

Throughout the experimental period, feed intake from milk, starter, BH and total feed intake as DM, TDN and DCP (Table 3) was affected significantly (P<0.001) by species. However, feed intake from roughages (BH) was nearly similar in DM and was significantly (P<0.001) higher in Holstein than buffalo calves in TDN and DCP values.

On the other hand, feed intake of calves was not affected by Pronifer supplementation. It is of interest to note that feed intake from milk and starter as DM, TDN and DCP was significantly (P<0.05) higher in the control and supplemented buffalo calves than the control and supplemented Holstein calves. Feed intake from roughages as TDN and DCP showed significantly (P<0.05) the opposite trend, however, feed intake from roughages as DM did not differ significantly (Table 3).

Although there was nearly similarity in DM intake from roughages, between both species, the significant increase in feed intake from roughages as TDN and DCP by Holstein than buffalo calves was mainly related to the higher content of TDN and DCP in berseem hay intaked by Holstein than buffalo calves (Table 3).

Similar results were obtained by El-Basiony *et al.* (2001), who found that feed DM, TDN and DCP intakes insignificantly increased by about 2-3% in buffalo calves fed diet supplemented with one g Pronifer/kg CFM during different stages of growth as compared to their controls. Results of using yeast culture as a supplement in ration of lactating cows (Harris and Webb, 1990; Robinson, 1997 and Abdel-Khalek *et al.*, 2002) and unpublished data on suckling Friesian calves (Ragheb, 2003) and growing Friesian calves (Ragheb *et al.*, 2003) confirmed these results. In other investigations, supplemental yeast culture significantly increased total DM intake of lactating cows (Erasmus *et al.*, 1992; Wohlt *et al.*, 1998, Robinson and Garrett, 1999 and Dann, *et al.*, 2000). On the other hand, El-Basiony *et al.* (2001) found that adding Pronifer to ration of fattening buffalo calves insignificantly decreased DM, TDN and DCP intakes.

Nutrient digestibility coefficients:

Digestibility coefficients of DM, CP, CF and EE were significantly (P<0.05) higher in Holstein than buffalo calves. As affected by Pronifer supplementation, only digestibility coefficients of DM and CF significantly (P<0.05) improved by about 13.06 and 6.26%, respectively, in the supplemented than the control calves. Among all experimental groups, Holstein calves fed the supplemented diets showed significantly (P<0.05) the highest digestibility coefficients of DM, CP, CF and EE, while buffalo calves fed the control diets showed the lowest values. However, digestion of NFE did not differ significantly as affected by species, Pronifer supplementation and their interaction (Table 4).

It is of interest to note that improvement in digestion coefficient of supplemented groups was higher in buffalo (9.4%) than in Holstein (4%) calves.

Table (3): Effect of Pronifer supplementation on daily feed intake as DM, TDN and DCP.

Item	Feed consumption											
	Milk			Starter			Roughage			Total		
	DM	TDN	DCP	DM	TDN	DCP	DM	TDN	DCP	DM	TDN	DCP
Species:												
Holstein calves (H)	440^{b}	582^{b}	105^{b}	612^{b}	446^{b}	100^{b}	230	144^{a}	33^{a}	1282^{b}	1772^{a}	238^{b}
Buffalo calves (B)	483^{a}	640^{a}	116^{a}	709^{a}	515^{a}	115^{a}	235	122^{b}	18^{b}	1427^{a}	1277^{b}	249^{a}
±MSE	2.2***	2.5***	0.53***	4.6***	3.1***	3.7***	2.5^{NS}	2.2***	1.8***	6.0***	2.9***	0.73***
Treatment:												
Control calves (C)	458	606	109	670	486	109	234	134	26	1362	1226	244
Suppl. calves (S)	465	616	112	651	475	106	231	132	25	1347	1223	243
±MSE	3.8^{NS}	4.0^{NS}	1.3^{NS}	8.8^{NS}	43^{NS}	1.2^{NS}	2.0^{NS}	1.3^{NS}	1.5^{NS}	5.5^{NS}	0.75^{NS}	0.95^{NS}
Interaction (Species x Treatment):												
CH	437^{b}	578^{b}	104^{b}	610^{b}	449^{b}	100^{b}	230	145^{a}	33^{a}	1277^{b}	1172^{b}	237^{b}
SH	443^{b}	587^{b}	106^{b}	601^{b}	443^{b}	99^{b}	229	144^{a}	33^{a}	1273^{b}	1174^{b}	238^{b}
CB	478^{a}	633^{a}	114^{a}	710^{a}	523^{a}	117^{a}	238	123^{b}	18^{b}	1426^{a}	1279^{a}	249^{a}
SB	488^{a}	646^{a}	117^{a}	690^{a}	508^{a}	113^{a}	232	120^{b}	18^{b}	1410^{a}	1274^{a}	248^{a}
±MSE	2.1	3.0	1.2	5.5	4.1	2.2	2.0	2.1	1.8	4.7	1.9	0.62

a and b: Means denoted with different superscripts within the same column are significantly different at P<0.05).
NS not significant at P ? 0.05   * ** Significant at P<0.001.

The observed increase in DM and CF digestion of calves of the supplemented groups as compared to the control groups was associated with the better response of rumen fermentation to Pronifer supplementation. Williams (1989) found that yeast culture added to ration of dairy cattle enhanced initial rate of ruminal digestion of diet. These results were confirmed by the findings of many investigators, who found that lactobacillus culture could increase digestibility of CF (El-Basiony, *et al.*, 1997; Abdel-Khalek, *et al.*, 2002 and Al-Dabeeb and Ahmed, 2002). Also, addition of *Saccharomyces cerevisiae* culture to the diet of sheep has improved the digestion of DM, CP, and hemicelluloses, which in turn led to increase in digestibility of protein and flow of microbial nitrogen to post-ruminal (Allam, *et al.*, 2001). However, Al-Dabeeb and Ahmed (2002) found insignificant effect in the digestibility of NFE in sheep fed on different diets supplemented with yeast culture.

Table (4): Digestibility coefficient by calves at weaning age as affected by species, treatment and their interaction.

Item	Digestibility coefficient (%)				
	DM	CP	CF	EE	NFE
Species:					
Holstein (H)	86.54^{a}	85.96^{a}	58.59^{a}	88.97	87.26
Buffaloes (B)	80.80^{b}	76.6^{b}	45.53^{b}	81.50	87.63
±MSE	1.21*	1.80*	2.10*	1.96*	1.13^{NS}
Pronifer supplementation:					
Control (C)	82.41^{b}	81.58	50.48^{b}	85.73	86.70
Suppl. (S)	84.93^{a}	80.98	53.64^{a}	84.74	88.19
±MSE	0.49*	1.20^{NS}	0.58*	1.20^{NS}	1.02^{NS}
Interaction:					
CH	85.17^{b}	86.11^{a}	57.45^{b}	89.61^{a}	86.00
SH	87.91^{a}	85.80^{a}	59.72^{a}	88.32^{a}	88.52
CB	79.65^{d}	77.05^{b}	43.50^{d}	81.85^{b}	87.40
SB	81.95^{c}	76.15^{b}	47.55^{c}	81.15^{b}	87.85
±MSE	0.71	1.39	0.42	1.93	0.76

a, b....d: Means denoted with different superscripts within the same column are significantly different at P<0.05. NS not significant at P? 0.05 * significant at P<0.05.

Blood constituents:

Data in Table (5) revealed that concentrations of urea in blood serum were significantly (P<0.05) higher by about 7.8%, while total protein and calcium concentrations were significantly (P<0.05) lower by about 3.3 and 13.8%, respectively, in Holstein than buffalo calves. However, concentrations of albumin, globulin cholesterol and inorganic phosphorus in blood serum did not differ significantly between both species. Pronifer supplementation resulted significant (P<0.05) improvements in concentrations of total protein, albumin and globulin by about 11.5, 11.3 and 11.8%, respectively, and significant (P<0.05) decrease in cholesterol concentration by about 8.5% occurred in supplemented calves of both species compared with their controls. However, concentration of urea, calcium and inorganic phosphorus was not affected significantly by Pronifer supplementation.

In comparisons among the experimental groups, the supplemented Holstein calves showed significantly (P<0.05) the highest concentration of total protein,albumin and globulin, and the lowest concentration of cholesterol and calcium (Table 5).

Table (5): Least square means of blood parameters of calves at weaning age as affected by species, treatment and their interaction.

Item	Total protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	Albumin/ Globulin ratio	Cholesterol (mg/dl)	Urea (mg/dl)	Calcium (mg/dl)	Inorganic phosphorus (mg/dl)
Species:								
Holstein (H)	7.85	4.25	3.60	1.18	55.33	48.72	8.34	6.90
Buffaloes (B)	8.12	4.37	3.75	1.17	56.60	46.09	9.67	7.19
±MSE	0.06*	0.05^{NS}	0.06^{NS}	0.005^{NS}	0.96^{NS}	0.40*	0.31*	0.17^{NS}
Pronifer supplementation:								
Control (C)	7.55^{b}	4.08^{b}	3.47^{b}	1.18	58.46^{a}	47.46	9.45	7.07
Suppl. (S)	8.42^{a}	4.54^{a}	3.88^{a}	1.17	53.47^{b}	48.35	8.56	7.02
±MSE	0.12*	0.09*	0.08*	0.004^{NS}	0.91*	0.98^{NS}	0.30^{NS}	0.14^{NS}
Interaction: (Species x Treatment)								
CH	7.18^{d}	3.85^{c}	3.33^{c}	1.16	57.21^{a}	48.37^{a}	8.66^{c}	6.91
SH	8.52^{a}	4.65^{a}	3.87^{a}	1.20	53.44^{b}	51.06^{a}	8.0^{b}	6.88
CB	7.92^{c}	4.32^{ab}	3.60^{ab}	1.20	59.71^{a}	46.55^{b}	10.23^{a}	7.22
SB	8.31^{b}	4.42^{a}	3.89^{a}	1.14	53.49^{b}	45.63^{b}	9.11^{a}	7.15
±MSE	0.05	0.04	0.06	0.003	0.83	0.89	0.28	0.12

a , b and d: Means denoted with different superscripts within the same column are significantly different at P<0.05).
NS not significant at P ? 0.05   * Significant group differences at P<0.05

The present results regard to concentration of total protein and their fractions could be related to a tendency of higher protein digestibility in the supplemented than control Holstein calves (Table 4). Nearly similar trend was observed on suckling Friesian (Abdel-Khalek *et al.*, 2000) and on buffalo calves (El-Ashry *et al.*, 2002).

In agreement with the obtained results, Abdel-Khalek *et al.* (2000) reported significant decrease in concentration of cholesterol in plasma of suckling calves fed yeast culture. In general, the present values of blood constituents are within the normal range reported on growing Friesian calves (Metwally *et al.*, 1999) and buffalo calves (El- Ashry *et al.,* 2002). The present results of calves fed Pronifer supplemented diets as compared to the controls may indicate the beneficial effect of Pronifer by improving protein and fat metabolism without any adversely effects on calf health. The effect was nearly similar on both species.

Growth performance:

Throughout the experimental period, averages of total weight gain and daily gain were not affected significantly by species, but they were affected significantly ($P<0.001$) by Pronifer supplementation by about 14.89% for total gain and 15.23% for average daily gain, being higher in calves fed the supplemented than the control diet. Calves fed the supplemented diets in both species showed significantly ($P<0.05$) higher in final weight, total gain and average daily gain than their controls (Table 6).

It is of interest to note that the significant ($P<0.001$) increase in feed intake of buffalo compared with Holstein calves (Table 3) was associated with slightly higher feed efficiency in Holstein than buffalo calves. However, the significant($P<0.001$)improvement in growth of calves fed the supplemented diets was reflected in better feed efficiency for each kg DM,TDN or DCP of diet fed to the supplemented than the control Holstein or buffalo calves(Table 6).

The higher gain of suckling calves fed dietary Pronifer was reported on suckling Friesian calves (Ibrahim *et al.,* 1997 and Abdel-Khalek *et al.,* 2000) and buffalo calves (El-Basiony *et al.,* 1997). Many investigators have attributed the beneficial effects of yeast culture directly to change in the ruminal fermentation and in microbial population in the digestive tract (Wallace, 1994, Newbold *et al.* 1996 and Dawson and Tricarico, 2002) and increasing flow of bacterial nitrogen to the small intestine (Erasmus *et al.*, 1992), which stimulate protein synthesis in growing animals.

Economic efficiency:

From the economic point of view, feeding calves on the supplemented starter (Table 7) revealed that daily feed cost of each calf was higher in buffalo than Holstein calves and slightly higher in the supplemented than the control calves in both species. The higher average daily gain of buffalo calves was associated with higher feed intake (Table 3) and, in turn higher feed cost/kg gain as compared to the Holstein calves. However, the higher average daily gain of the supplemented calves in both species was associated with unchanged feed intake and, in turn lower feed cost/kg gain as compared to the control calves.

Table (6): Growth performance and feed efficiency of calves as affected by species, Pronifer supplementation and their interaction.

Item	Initial Weight (kg)	Final weight (kg)	Total gain(kg)	Average daily gain(kg)	Feed efficiency(Gain kg./kg.intake)		
					DM	TDN	DCP
Species:							
Holstein (H)	36.50	94.16	57.66	0.577	0.453	0.492	2.43
Buffaloes(B)	36.36	97.28	60.92	0.607	0.428	0.475	2.44
±MSE	1.15^{NS}	2.61^{NS}	2.57^{NS}	0.03^{NS}	-	-	-
Pronifer supplementation:							
Control (C)	36.62	91.98^{b}	55.35^{b}	0.552^{b}	0.408	0.450	2.27
Suppl. (S)	36.22	99.81^{a}	63.59^{a}	0.636^{a}	0.474	0.520	2.62
±MSE	1.10^{NS}	2.4^{***}	2.36^{***}	0.041^{***}	-		-
Interaction: (Species x Treatment)							
CH	37.50	89.62^{b}	52.12^{b}	0.521^{b}	0.408	0.445	2.20
SH	35.50	98.70^{a}	63.20^{a}	0.632^{a}	0.496	0.538	2.66
CB	35.92	93.86^{b}	57.94^{b}	0.576^{b}	0.404	0.450	2.31
SB	36.80	100.69^{a}	63.89^{a}	0.639^{a}	0.453	0.502	2.58
±MSE	1.12	2.44	2.34	0.024	-	-	-

a and b: Means denoted with different superscripts within the same column are significantly different at P<0.05).
NS not significant at P ? 0.05 *** Significant group differences at P<0.001

Table (7): Economic efficiency of calves as affected by species, Pronifer supplementation and their interaction.

Item	Daily cost of feed stuff (L.E)				Total daily feed cost (L.E)	Average daily gain (kg)	Feed cost/kg gain(L.E)	Relative feed cost (%)
	Milk	Starter	BH	Pronifer				
Species:								
Holstein (H)	3.37	0.51	0.08	0.015	3.97	0.577	6.96	94.6
Buffaloes (B)	3.73	0.59	0.12	0.015	4.46	0.607	7.35	100
Pronifer supplementation:								
Control (C)	3.53	0.56	0.10	-	4.18	0.522	7.56	100
Suppl. (S)	3.58	0.54	0.1.	0.03	4.25	0.636	6.68	87.7
Interaction: (Species x Treatment)								
CH	3.35	0.51	0.08	-	3.94	0.521	7.56	100
SH	3.39	0.50	0.08	0.03	4.00	0.632	6.33	83.7
CB	3.70	0.60	0.12	-	4.42	0.576	7.67	100
SB	3.76	0.58	0.12	0.03	4.49	0.639	7.03	91.7

- Price of milk, starter and BH were 1.0, 750 and 450 L.E, respectively. Price of Pronifer was 10.0 L.E/kg.

Generally, total feed cost/kg gain decreased by about 5.31% in Holstein than buffalo calves and about 11.64% in the supplemented than the control calves in both species. The rate of reduction in total feed cost/kg gain was higher in Holstein (16.3%) than buffalo (8.3%) calves (Table 7).

Based on the forgoing results, it could be concluded that feeding suckling calves on diet supplemented with Pronifer has beneficial effects on their growth performance, digestibility coefficients, blood parameters and economic and feed efficiencies.

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دراسة مقارنة على تأثير إضافة البرونيفير على أداء عجول الهولشتين و الجاموس الرضيعة.

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استخدم في هذة الدراسة ٤٠ عجلا من الهولشتين و ٤٠عجلا من الجاموس بعد رضاعة السرسوب مباشرة- قسمت عجول كل نوع عشوائيا إلى مجموعتين متشابهتين تبعا للوزن و الجنس حيث تم تغذية العجول في مجموعة المقارنة على علف بادىء و دريس برسيم بالإضافة إلى اللبن البقرى طوال فترة الرضاعة و حتى الفطام على عمر ٣ شهور وقد غذيت عجول المجموعة التجريبية على نفس العلائق ولكن أضيف إلى لبن الرضاعة البقرى ١جم برونيفير/لتر لبن.

خلال الفترة التجريبية تم أخذ عينات دم من كل العجول عند نهاية الفترة التجريبية كذلك تم تسجيل وزن الجسم والغذاء المأكول وعمل تجارب هضم و كذلك الكفاءة الغذائية والكفاءة الاقتصادية فى نهاية التجربة لكل مجموعة داخل كل نوع.

من هذه الدراسة تم استنتاج النتائج التالية:

١. في كل من المجموعة التجريبية أو المقارنة تفوق الجاموس على الهولشتين معنويا في كمية الغذاء المأكول وبالتالي المأكول الكلى كمادة جافة وTDN, DCP بينما لم يتأثر الغذاء المأكول معنويا بإضافة البرونيفير

٢. ذادت معاملات الهضم لكل من المادة الجافة، البروتين الخام, الألياف الخام و مستخلص خالى الأزوت معنويا فى الهولشتين عن الجاموس. بينما تحسنت معاملات هضم المادة الجافة والأليلف الخام في المجموعة التجريبية عن المقارنة لكل من النوعين. و لم تتأثر معاملات هضم مستخلص الأثير معنويا.

٣. خلال الفترة التجريبية لم يؤثر النوع معنويا على الوزن النهائي ووزن النمو الكلى ومعدل النمو اليومي، بينما ذادت هذة القياسات معنويا بإضافة البرونيفير.

٤. أظهرت النتائج أن تركيز اليوريا في بلازما الدم كان مرتفعا معنويا (٧,٨%) في حين أن مستوى البروتين الكلى و الكالسيوم انخفض معنويا بمعدل ٣,٣% و ١٣,٨% على الترتيب في عجول الهولشتين مقارنة بعجول الجاموس كما أن تركيز البروتين الكلى، الألبيومين، الجلوبيولين قد تحسن معنويا بما يعادل ١١,٥%، ١١,٣% و ١١,٨% على الترتيب وانخفض الكوليستيرول بما يعادل ٨,٥% فى المجموعة التجريبية لكلا النوعين عن المجموعة المقارنة.

٥. أوضحت النتائج زيادة الكفاءة الغذائية والاقتصادية للعجول المغذاة على عليقه المعاملة عن العجول المقارنة. وكذلك إنخفض السعر لكل كجم نمو ليصبح حوالى ٥,٣ % لعجول الهوليشتين مقارنة بالعجول الجاموسى وأيضا حوالى ١١,٦% للعجول المغذاة على العلائق التجريبية مقارنة بمجموعة المقارنة .

وتوصى الدراسة بإمكانية إضافة البرونيفير بمعدل ١ جم/لتر لبن خلال فترة الرضاعة للعجول حيث أعطت أفضل النتائج من حيث زيادة معاملات الهضم للمادة الجافة و الألياف الخام, خصائص الدم (البروتين الكلى، الألبيومين والجلوبيولين) و أعلى كفاءة غذائية واقتصادية.