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EFFECT OF FORAGE TYPE ON DIGESTIBILITY COEFFICIENTS, RUMEN FUNCTION, BLOOD PARAMETERS AND GROWTH PERFORMANCE OF SUCKLING FRIESIAN CALVES.

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ABSTRACT

Thirty newly born Friesian calves (15 males and 15 females) were divided into three similar groups to study the effect of different forage types on digestibility coefficients, rumen and blood parameters, growth performance and economic efficiency during the suckling period at 113 days of age. Calves were fed whole milk and starter plus fresh berssem (FB) in the 1st group), 50% fresh berseem and 50% berseem hay (FB+BH) in the 2nd group and berseem hay (BH) in the 3rd group. Three digestibility trials were conducted at 10 weeks of age on the tested forage diets. Some rumen and blood parameters were also investigated. Results revealed that calves fed FB diet showed significantly ($P<0.05$) the highest digestibility coefficients of DM, OM CP, EE and NFE, the highest nutritive values, the lowest digestibility coefficients of CF, the highest concentration of total VFAs and NH_3-N in rumen liquor taken 3 hours after morning feeding, the highest concentration of glucose, total protein, albumin and globulin in blood plasma collected before morning feeding, the highest LBW and daily gain, the best efficiency of metabolizable energy (ME) and digestible crude protein (DCP) utilization of and the highest economic efficiency as compared to FB+BH and BH diets. While, the differences in pH values in rumen liquor, and concentration of haemoglobin and activity of GOT and GPT in blood plasma were not significant.

Feeding suckling calves on fresh berseem as a forage type beside starter showed the highest growth performance and economic efficiency as compared to mixture of fresh berseem and berseem hay or berseem hay alone.

Keywords: Berseem, hay, suckling calves, digestibility, rumen, blood, growth.

INTRODUCTION

A good nutrition and health program will produce calves able to give their maximum potential and will be economically efficient. Consumption of forage feed is necessary and responsible for rumen development (rumen size, musculature and papillary development as well as establishment of bacteria and protozoa and other microorganisms). Stimulation of forage intake will hasten the time when the calf can depend on digestion in the rumen to make major nutritional contributions (Church, 1991). Type and quality of solid feeds offered to suckling ruminants directly influence the success of methods applied to rearing these animals (Abdel-Khalek, 1986).

Egyptian clover namely berseem (*Trifolium alexandrinum*) is an important feed legume grown in the Mediterranian area. It is valued for its rapid growth in the cooler winter season in the subtropics and for its good recovery after cutting or grazing (McDonald *et al.*, 1995). It is the main forage crop in Egypt and it supplies animals with the most of their nutritive requirements.

The intent of haymaking is to harvest the crop at a more or less optimum stage of maturity in order to provide a maximal yield of digestible nutrients per unit of land without damage to the next crop. Although high quality legume hay may be excellent sources of protein, minerals and vitamins. While, digestibility of energy in hay is usually only moderate, where most hays being within the range of 50-60% TDN. In addition, it is well recognized that the net energy of hay is relatively less as a percentage of the digestible energy. This is a result of a number of different factors and it is an indication that maximal production cannot be achieved on hay alone (Church, 1991).

On the other hand, average feed intake, digestion coefficients of most nutrients and nitrogen balance were found to be higher in green clover than clover hay, but feed efficiency was higher for clover hay than fresh clover (Mostafa, 1981 and Gaafer *et al.* 2004).

The objective of the present work was to investigate the effect of feeding fresh berseem, berseem hay or its mixture on the performance of Friesian calves during suckling period.

MATERIALS AND METHODS

The experimental work of the present study was carried out at Animal Production Research Station, Sakha, Kafr El-Sheikh governorate, belonging to Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture during the period from December 2003 to May 2004

Animals and feeding system:

Thirty newly born Friesian calves with average body weight of 34.88 ± 0.40 Kg were taken after 4 days of feeding colostrums. Calves were divided into three similar groups, 10 calves in each (5 males and 5 females). Through the whole suckling period at the beginning of the 2nd week of age, calves in all groups were fed whole cow's milk and starter plus fresh berseem (the 2nd and 3rd cuts) for calves in the 1st group (FB), fresh berseem (the 2nd and 3rd cuts) and berseem hay (3rd cut) at rat of 1:1 (on DM basis) for calves in the 2nd group (FB+BH) or berseem hay (3rd cut) for calves in the 3rd group (BH). Amount of daily feeds for calves in each group were offered according to the recommendation of NRC (1996). All calves were fed fresh cow's whole milk twice daily at 7 a.m. and 5 p.m. Starter was offered at 8 a.m., while type of the forage was offered at 9 a.m. and water was available all daytime.

Throughout the suckling period from birth to weaning (113 days of age), live body weight was weekly recorded starting from birth to weaning. Chemical analysis of different feedstuffs including whole milk, starter, fresh berseem, berseem hay is shown in table (1).

Digestibility trials:

Three digestibility trials were conducted during the suckling period (10 weeks of age) using 6 calves (3 males and 3 females) from each groups to determine the nutrients digestibility coefficients and nutritive values of the experimental diets using acid insoluble ash method according to **Vankeulen** and Young (1977).

Table (1): Chemical analysis of tested feedstuffs formulated in different experimental diets fed to calves.

Item	DM%	Chemical analysis on DM basis, %					
		OM	CP	CF	EE	NFE	Ash
Whole milk	12.80	94.15	26.40	-	30.25	37.50	5.85
Starter*	91.50	91.25	17.65	5.95	3.75	63.90	8.75
FB**	15.40	88.65	16.10	24.50	3.20	44.85	11.35
BH***	89.20	89.55	12.80	28.45	2.95	45.35	10.45

* Starter consisted of 15% soybean meal, 15% linseed meal, 35% corn grain, 20% wheat bran, 10% rice bran, 2% molasses, 2% limestone and 1% common salt. FB: Fresh berseem BH: Berseem hay. ** Average of the 2nd and 3rd cut. *** The 2nd cut

Feed intake of each calf was recorded and samples of feces were taken from the rectum through a collection period of five days at 10 weeks of age. Samples of the tested diets and feces were taken for chemical analysis according to AOAC (1990).

At the end of collection period of the digestibility trials, rumen liquor samples were collected from each calf (6 animals) in each group at 3 hours after the morning feeding by stomach tube. Rumen pH was immediately determined using a Beckman pH meter. Concentration of volatile fatty acids (VFAs) in rumen liquor was determined using steam distillation methods of Warner (1964), while concentration of ammonia-nitrogen (NH_3-N) was determined in filtered rumen liquor according to the method of Conway (1962).

Blood sampling:

At the same time of rumen liquor collection before morning feeding, blood samples were taken from the jugular vein of the same calves used in the digestibility trials (6 animals in each group) by sterile needle into clean dry glass tubes using heparin as an anticoagulant. Thereafter, blood was centrifuged at 4000 rpm for 15 minutes to obtain blood plasma.

Plasma samples were kept in deep freezer (-20 °C) till chemical analysis. Concentration of haemoglobin was determined directly in fresh whole blood; meanwhile concentration of glucose, total protein and albumin as well as activity of glutamic oxaloacetic transaminase (GOT) and glutamic puruvic transaminase (GPT) was determined in blood plasma. All blood parameters and enzymic activity were colorimetrically using commercial diagnostic kits (Test combination, Pasteur Lap.).

On the other hand, concentration of globulin was calculated by difference between total protein and albumin concentration. Biochemical parameters in blood plasma were analyzed according the authors presented in table (2):

Statistical analysis:

Experimental data were statistically analyzed using General Liner Models Procedure adapted by SPSS (1997) and Duncan s multiple rang test was employed to test for significant differences by Duncan (1955).

Table (2): References used in analytical methods of biochemical parameters in blood plasma.

Blood parameter	Reference
Total protein	Cornall *et al.* (1949)
Albumin	Weichselaum (1946)
Glucose	Trinder (1969)
GOT and GPT	Reitman and Frankal (1957)

RESULTS AND DISCUSSION

Chemical composition of the experimental rations:

Calculated chemical composition of the experimental diets presented in table (3) revealed that replacing fresh berseem partially in FB+BH diet or completely in BH diet by berseem hay increased DM and CF contents and decreased CP content, while contents Table 3). This was associated with low DM and CF contents and high CP of OM, EE, NFE and ash were nearly similar in all experimental diets (content in fresh berseem as compared to berseem hay (Table 1).

Table (3): Chemical composition of the experimental diets fed to calves.

Item	DM%	Chemical composition on DM basis, %					
		OM	CP	CF	EE	NFE	Ash
FB (G1)	23.55	91.65	20.10	7.74	11.98	51.83	8.35
FB+BH (G2)	26.99	91.62	19.52	8.84	11.45	51.81	8.38
BH (G3)	33.21	91.66	18.94	9.77	11.06	51.89	8.34

FB: Fresh berseem
BH: Berseem hay

The decreasing of CP and increasing in CF content in FB+BH and BH diets compared with FB diet may be due to the losses of leaves during hay making, which contain about two-third of total protein content. In this connection, Yoshida *et al.* (1971) found that the losses in nutrients during hay making were 10% for CP. Nawar (1969) proved that making clover hay by traditional methods is wasteful since it involves great losses in nutrients up to 70%.

Generally, it seems that all tested diets were nearly similar in energy and CP conents.

Digestibility coefficients:

Data in table (4) showed that the digestibility coefficients of DM, OM, CP and EE were significantly ($P<0.05$) the highest, and those of CF and NFE were the lowest for FB diet. While, BH diet showed the opposite trend and FB+BH diet showed significantly ($P<0.05$) moderate values. The significant ($P<0.05$) superiority of digestibility coefficients of CP and EE in FB diet and digestibility coefficients of CF in BH diet was associated with higher contents of these nutrients in FB and BH diets (Table 3).

The significant increase in DM, OM and EE as well as in CP digestbility for FB diet reflected in significantly (P<0.05) the highest nutritive values as TDN and DCP, respectively in this diet. On the other hand, BH diet showed the lowest nutritive values and FB+BH diet showed moderate coefficients (Table 4).

The significantly higher digestibility coefficient of nutrients in FB diet may be due to lower DM intake and/or higher content TDN in FB diet as compared to FB+BH and BH diets (Table 7). The significant increase in digestion of FB diet is in agreement with statement of Nelson (1969) and Ragheb (1985), who reported that the increase in dietary energy improved the digestibility of all nutrients except CF digestion by calves.

Table (4): Nutrient digestibility coefficients and nutritive values of the experimental diets.

Item	Experimental diet			
	FB (G1)	FB+BH (G2)	BH (G2)	±SEM
Digestibility coefficients (%):				
DM	68.95^{a}	67.72^{b}	66.46^{c}	0.37
OM	71.28^{a}	70.05^{b}	68.84^{c}	0.36
CP	80.23^{a}	76.34^{b}	73.60^{c}	0.96
CF	25.42^{c}	28.76^{b}	30.53^{a}	0.75
EE	80.27^{a}	78.68^{b}	76.84^{c}	0.50
NFE	76.94^{b}	77.35^{ab}	77.72^{a}	0.13
Nutritive values (%):				
TDN	79.61^{a}	77.79^{b}	76.37^{c}	0.47
DCP	16.13^{a}	14.90^{b}	13.94^{c}	0.32

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

The observed increase in nutrient digestibility coefficients of FB than BH diets is in agreement with those obtained by Gaafer *et al.* (2004), who found that digestibility coefficients of DM, OM, CP and EE were significantly higher and that of CF was significantly lower in FB than BH. Similar trends were observed by Mostafa (1981). The marked reduction in CF digestion for FB compared with BH diet may be associated to decreased in cellulytic bacteria count in rumen liquor of calves fed FB compared with BH diets. Also, such trend may be related to the effect of type of forage on development of rumen during the suckling period (Abdel-Khalek, 1986).

Reddy *et al,* (1987), reported that concentrates or good quality forage seem to be well digested by the young calf. Also, Church (1991) observed lower nutrients digestibility of hay with less feeding values. On the other hand, Abdel-Raouf (1999) found that hay alone did not allow maximal growth because the amount and rapidity of digestion restricts energy intake by ruminants. This occurs because rumen digestion of cellulose and other fibrous components is relatively slow, incomplete and does not provide enough digestible nutrients to allow maximal growth.

Rumen function:

Ruminal pH values and concentration of total VFAs and NH_3-N are presented in table (5). The differences in ruminal pH value among calves fed different experimental diets were not significant, ranging between 6.35 and 6.45. The obtained ruminal pH values in all groups are within the normal range (6.2-6.9) reported on suckling Friesian calves by Metwally *et al.* (1999) and Abdel-Khalek *et al.* (2000).

Concentration of total VFAs in rumen liquor showed significant differences among dietary groups, being the highest (9.50 meq/100 ml), in FB group, followed by FB+BH group (8.97 meq/100 ml), while calves fed BH diet showed the lowest concentration (7.17 meq/100 ml). However, concentration of total VFAs in rumen liquor of calves in all groups is within the physiological norms of suckling Friesian calves fed nearly the same diets used in this study, ranging between 7.67 and 10.32 meq/100ml (Abdel-Raouf, 1999).

Table (5): Average of pH value and concentration of total VFAs and NH_3-N in rumen liquor of Friesian calves fed the tested diets

Item	Experimental group			
	FB (G1)	FB+BH (G2)	BH	±SEM
pH value	6.35	6.42	6.45	0.02
TVFA's (meq/100ml)	9.50^{a}	8.97^{b}	7.17^{c}	0.19
NH3-N (mg/100ml)	18.98^{a}	18.25^{b}	17.60^{c}	0.10

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

Average concentration of NH_3-N in the rumen liquor of calves was affected significantly (P<0.05) by the experimental diets, being the highest in calves fed fresh berseem (8.98 mg/100 ml), followed by those fed fresh berseem and berseem hay (8.25 mg/100 ml), meanwhile calves fed berseem hay diet showed significantly (p<0.05) the lowest concentration (7.60 mg/100 ml). Such results are nearly similar to those reported by Koriet (1986); Abdel-Raouf (1999). Abdel-Khalek *et al.* (2000) found that NH_3-N concentration ranged between 16.7 and 19.3 mg/100 ml in rumen liquor collected 3 hours after morning feeding from Friesian calves 10 and 15 weeks of age.

It was found that NH3-N concentration increased when calves were fed on FB diet as compared to FB+BH and BH diets. This trend may be attributed to increasing level of dietary CP and digestibility coefficient of CP in FB group. However, in this group concentration of total VFAs increased, although CF content and CF digestion were lower than FB+BH and BH groups.

Blood parameters:

Concentration of total protein and their fractions, and haemoglobin as well as activity of transaminases (GOT and GPT) in blood plasma are shown in table (6). Data revealed that calves of group FB had significantly (P<0.05) higher concentrations of glucose, total protein, albumin and globulin than BH

group, while calves of group FB+BH had moderate values and did not differ significantly than FB and BH groups.

On the other hand, there were no significant differences in concentrations of hemoglobin and activity of GOT and GPT among different groups. Activity of GOT and GPT is in agreement with those reported on suckling Friesian calves by Abdel-khalek *et al.* (2000)

The observed significantly higher concentrations of glucose, and total protein and their fractions in plasma of calves fed FB diet could be attributed to increasing digestibility and nutritive values of their diets, respectively (Table 4).

Concentrations of total protein, albumin and globulin as well as haemoglobin in blood plasma are in accordance with those obtained by Abdel-khalek *et al.* (2000), El-Ashry *et al.* (2002) and Ragab (2003) on suckling calves. Also, Mahmoud and Mohalka (1978) reported that plasma protein concentration increased with increasing CP content in the diet.

Table (6): Average concentration of blood parameters in plasma of Friesian calves fed different experimental diets taken at weaning age (16 weeks).

Item	Experimental group			
	FB (G1)	FB+BH (G2)	BH (G3)	±SEM
Haemoglobin (g/dl)	11.45	11.30	11.35	0.01
Glucose (mg/dl)	54.50^{a}	51.75^{b}	51.55^{b}	0.25
Total protein (g/dl)	8.65^{a}	7.90^{ab}	7.25^{b}	0.10
Albumin (g/dl)	4.60^{a}	4.15^{ab}	3.85^{b}	0.06
Globulin (g/dl)	4.05^{a}	3.75^{ab}	3.40^{b}	0.05
GOT (IU/L)	32.60	32.80	32.75	0.02
GPT (IU/L)	17.90	18.15	18.30	0.10

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

Regarding the noticeable increase in glucose concentration in plasma of calves fed FB diet, Perry and Cecava (1995) found that feeding high-energy diets increased propionic acid production in the rumen and most of the propionic acid that is absorbed from the gut is converted to glucose by the liver.

Growth performance:

Data in table (7) revealed that average live body weight (LBW) and average daily gain (ADG) were significantly ($P<0.05$) higher in calves fed FB diet than those fed FB+BH and BH at 5, 10 and 16 (weaning) weeks of age. However, LBW and ADG of calves fed FB+BH diet tended to be insignificantly higher than those fed BH diet at 5 wk, 10 wk and weaning age.

The trends of differences in LBW and ADG of calves fed different types of forage are in agreement with Gaafer *et al.* (2004), who found that calves fed FB diet had significantly ($P<0.05$) the highest LBW and ADG as compared to those fed BH or different levels of FB and BH at different

intervals of the suckling period. Similar results were obtained by Wells *et al.* (1998) and Abdel-Aal (2000).

Regarding the amount of feed intake as fed (Table 7), it was observed that average daily intake from starter, FB and BH were different according to moisture contents in FB and BH. This reflected in significant differences in total DM intake, being significantly (P<0.05) the highest (1.8 kg/h/d) for calves fed BH, moderate for calves fed FB+BH diet (1.73 kg/h/d) and the lowest for those fed FB diet (1.62 kg/h/d).

Such trend might be attributed to the lower DM content in FB diet (23.55%) compared to FB+BH diet (26.99%) and BH diet (33.21%). This trend is in agreement with that obtained by Wells *et al.* (1998) and Abdel-Aal (2000).

Table (7): Average of live body weight, daily gain and feed intake of suckling Friesian calves fed different experimental diets.

Item	Experimental group			
	FB (G1)	FB+BH (G2)	BH (G3)	±SEM
Number of calves	10	10	10	-
Suckling period (day)	113	113	113	-
Average daily feed intake/calf (as fed):				
Whole milk (kg)	4.0	4.0	4.0	-
Starter (g)	865	895	939	-
Fresh berseem (kg)	2.05	1.30	0.0	-
Berseem hay (g)	0.0	221	493	-
Total DM intake (kg)	1.62^{c}	1.73^{b}	1.80^{a}	0.02
Average LBW (kg):				
At birth	34.4	34.6	34.8	0.04
At 5 weeks of age	46.8^{a}	43.3^{b}	41.6^{b}	0.44
At 10 week of age	65.9^{a}	57.5^{b}	56.5^{b}	0.65
At weaning	103.1^{a}	91.8^{b}	94.5^{b}	0.66
Average daily gain (g):				
Birth- 5 wk	400^{a}	279^{b}	218^{b}	11.4
5-10 wk	544^{a}	407^{b}	427^{b}	11.3
10 week-weaning	867^{a}	821^{b}	836^{b}	16.5
Birth -weaning	608^{a}	515^{b}	511^{b}	11.1

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

Energy and protein efficiency:

Results in table (8) show that calves fed FB diet significantly (P<0.05) recorded the lowest daily intakes as TDN, DE and ME, and the highest intakes of net energy (NE) for maintenance and growth, reflecting the highest efficiency of metabolizable energy (ME) utilization as compared to calves fed FB+BH and BH diets.

Also, calves fed FB diet significantly (P<0.05) recorded the highest total DCP intake, DCP intake for maintenance, available DCP for gain, yield of gain protein and efficiency of dietary DCP utilization as compared to those fed FB+BH and BH diets.

Such differences indicated that calves fed FB were more efficient in dietary energy and protein utilization than those fed FB+BH and BH diets.

Table (8): Average daily intake of energy and protein, efficiency of energy and protein utilization and economic efficiency of Friesian calves fed different experimental diets.

Item	Experimental group			
	FB	FB+BH	BH	±SEM
Daily energy intake:				
TDN (kg)	1.29[b]	1.35[a]	1.37[a]	0.01
DE (Mcal)	5.69[b]	5.95[a]	6.04[a]	0.03
ME (Mcal)	4.66[b]	4.88[a]	4.95[a]	0.02
NEm (Mcal)	2.28[a]	2.00[b]	2.05[b]	0.02
NEg (Mcal)	1.43[a]	0.91[b]	0.97[b]	0.04
NEm+NEg (Mcal)	3.71[a]	2.91[b]	3.02[b]	0.06
Efficiency of ME utilization (%)	**79.61[a]**	**59.63[b]**	**61.01[b]**	**1.61**
Daily protein intake:				
DCP (g)	261.31[a]	257.77[a]	250.92[b]	1.50
DCP for maintenance (g)	41.85[a]	37.05[a]	38.35[b]	0.38
DCP for gain (g)	219.46[a]	220.72[a]	212.57[b]	0.66
Yield of gain protein (g)	139.27[a]	116.20[b]	121.64[b]	1.92
Efficiency of DCP utilization (%)	**63.46[a]**	**52.64[c]**	**57.22[b]**	**0.86**
Economic efficiency (%)				
Daily feed cost (LE/h)	4.26	4.32	4.38	0.03
Feed cost/kg gain (LE)	6.55[b]	7.97[a]	7.71[a]	0.10
Price of daily gain (LE/kg)	6.50[a]	5.42[b]	5.68[b]	0.02
Economic efficiency (%)	**152[a]**	**125[b]**	**130[b]**	**20**

a,b and c: Means in the same row with different superscripts differ significantly (P<0.05).
DE intake= TDN intake×4.409 and ME intake= DE intake×0.82 (McDonald et al.1995).
NEm (for maintenance)=0.086×$W^{0.75}$ and NEg (for growth)=(0.035×$W^{0.57}$)(ADG1.097)+ADG (Pond *et al.*, 1995).
Efficiency of ME utilization%=NEm+NEg×100/ME (NRC, 1996)
DCP for maintenance= 6.25[100/70(MEN×DMI+EUN)-MEN × DMI], where: MEN=5 g/kg DM intake and EUN = [2.6 × 77× $W^{0.75}$/1000] (NRC, 2001).
Yield of gain protein (g)=6.25[100/70(24×ADG (kg)] (McDonald *et al.*1995)
Efficiency of DCP utilization%=Yield of gain protein × 100/available DCP for gain (NRC, 1996).

The low efficiency of energy and protein utilization of calves fed 50% BH or 100% BH as a type of forage in their diets may be attributed to the appreciable loss of the soluble carbohydrates particularly glucose, fructose and sucrose in berseem hay . Variable loose of starch and fructose have been reported and there my also be losses in organic acids. In addition it is well recognized that the net energy of hay is relatively less as percentage of DE and some loss of N, which results in a decrease in protein N (Church, 1991).

In accordance with the present results, Gaafer *et al.* (2004) found that suckling calves fed FB diet was more efficient than those fed different levels of FB and BH or BH alone. Also, Morrill (1991) found that feeding green forage improved feed efficiency of Friesian calves as compared to BH. He

concluded that fresh berseem achieved a better-feed utilization, as it is excellent source of protein, minerals and vitamins compared with BH.

Data of economic efficiency presented in table (8) show no significant differences among different groups in average daily feed cost. However, calves fed FB diet recorded significantly ($P< 0.05$) the lowest feed cost per kg gain and the highest price of daily gain. So, feeding FB diet as a type of forage resulted in the highest economic efficiency as compared to those fed FB+BH or BH diets.

On the basis of the foregoing results, it could be concluded that feeding suckling Friesian calves on fresh berseem as a forage type during the sulking period increased nutrients digestibility coefficients, some rumen and blood parameters, live body weight, average daily gain, energy and protein efficiency and economic efficiency.

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تأثيـــر نـــوع العلف الخشن على معاملات الهضم، وظائف الكرش، خصائص الدم وأداء النمو للعجول الفريزيان الرضيعة.

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اســتخدم فى هذه الدراسة ٣٠ عجل فريزيان رضيع (١٥ ذكر ، ١٥ أنثى) قسمت إلى ثلاثــة مجمــوعات متماثلة، غذيت العجول خلال فترة الرضاعة على لبن كامل وعليقه بادئ مع البرســيم الطــازج فقــط (المجمــوعة الأولــى) ، البرسيم الطازج + دريس البرسيم بنسبة ١:١ (المجمــوعة الثانــية) أو دريس البرسيم فقط (المجموعة الثالثة). أجريت ثلاثة تجارب هضم فى الأسبوع العاشر من العمر لتقدير معاملات الهضم و القيم الغذائية للعلائق المستخدمة وكذلك أخذت عينات سائل الكرش و الدم بعد ثلاثة ساعات من التغذية الصباحية.

وقد أشارت النتائج المتحصل عليها إلى الآتي:

١- تفــوقت عجــول المجموعة الأولى المغذاة على عليقة البرسيم الطازج معنويا فى معاملات الهــضم لكــل مــن المادة الجافة-المادة العضوية- البروتين الخام ومستخلص الأثير، بينما انخفض معامل هضم الألياف الخام معنويا.

٢- تفوقت العجول المغذاة على عليقة البرسيم الطازج معنويا فى القيم الغذائية(TDN & DCP) عن تلك المغذاة على عليقة البرسيم الطازج+دريس برسيم أو دريس برسيم فقط.

٣- ذاد تركيز الأحماض الدهنية الطيارة الكلية و الامونيا فى سائل الكرش و تركيز الجلوكوز و البــروتين الكلى و الالبيومين والجلوبيولين فى بلازما الدم معنويا للمجموعة الأولى عن باقي المجموعات . بينما لم تختلف قيمة درجة حموضة فى سائل الكرش معنويا بين المجموعات.

٤- تفــوقت العجول المغذاة على عليقة البرسيم الطازج+دريس برسيم أو دريس برسيم فقط عن تلــك المغــذاة علــى عليقة البرسيم الطازج معنويا فى كمية المادة الجافة الكلية المأكولة و مجمــوع العناصر الغذائية المهضومة، بينما تفوقت العجول المغذاة على عليقة البرســيم الطازج أو البرسيم الطازج+دريس برسيم معنويا فى كمية البروتين المهضوم عن تلك المغذاة على عليقة دريس برسيم فقط.

٥- أظهرت العجول المغذاة على عليقة البرسيم الطازج معنويا أثقل وزن حي وأعلى معدل نمو يومــي وكفاءة التحويلية للطاقة القابلة للتمثيل و البروتين المهضوم و كفاءة اقتصادية مقارنة بالعجول المغذاة على البرسيم الطازج + دريس البرسيم بنسبة ١:١ أو دريس البرسيم فقط.

وتوصــي الدراســة بأفضلية تغذية عجول الفريزيان على البرسيم الأخضر عن مخلوط البرســيم والدريس أو دريس البرسيم فقط كعلف خشن خلال فترة الرضاعة بجانب العلف البادئ حيث أدى ذلك الى زيادة معاملات الهضم وزيادة وزن الجسم مع خفض تكلفة التغذية لانتاج كجم نمو.