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Effect of Dietary Supplementation of Chamomile Flowers on Digestability and Productive Performance of Baladi Growing Calves

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ABSTRACT

This study was conducted to evaluate the effects of added two levels of chamomile flowers to the rations of Baladi calves on growth performance, feeding values as well as some rumen and blood parameters. A total of 21 calves with an average live body weight of 100 kg, with an average age of 3-4 months were used in a feeding trial that lasted 360-d duration period. Animals were divided into three similar groups (7 in each group) and fed their basal ration according to NRC (1996) recommendations. The diets contained 0, 5 and 10 g chamomile flowers / 100 kg BW/day for treatments G_1 (control), G_2 and G_3, respectively. The basal ration (control) was formulated from concentrate feed mixture (CFM), berseem hay (BH) and rice straw (RS). In addition, 9 rams were used to evaluate the digestibility and feeding values of the experimental rations. Measurements of some rumen fermentation parameters and blood constitutes were determined as well. Results showed that the digestion coefficients of all nutrients and feeding values were improved with increasing the level of chamomile (0, 5 and 10g / 100 kg BW/ day) in the rations and the differences were mostly significantly between control ration and the high level of chamomile-ration. The results of rumen parameters showed that pH values, ammonia-N and TVFAs concentrations slightly changed over most sampling times among dietary treatments were observed, otherwise at sampling time (2hr post feeding), ammonia-N was significantly lower with the high chamomile ration than that of control one. However, addition of chamomile had significantly increased total volatile acids (TVFA's) concentrations at 4 hrs post feeding. The highest values of protozoa count and microbial protein at 4 hrs were recorded with G_3 (0.840 and 684, respectively) and the lowest values were recorded with G_1 (0.672 and 0.576, respectively). Regarding growth performance, the daily body gain (DBG) was higher with increasing chamomile level during the different growth periods. During 1period, the DBG in G_2 was insignificantly higher than G_1 but G_3 was significant higher than G_1. While, DBG during the second period was not significantly different among treatments. During the whole period, the final body weight was significantly higher with the two tested rations compared with that of unsupplemented one (control). Calves consumed approximately similar quantity of DM as g/ $kgw^{0.75}$ since all calves had similar body weight. The daily DM intake expressed as g/kg $w^{0.75}$ during the first period was higher than that consumed during the second period in all treatments. Most of the blood constituents were not significantly affected by adding chamomile flowers in the tested rations. The values of Hb and RBC,s tended to increase in animals given chamomile flowers and the differences were significant only for blood Hb concentration. Moreover, serum total protein and globulin concentrations were significantly higher with the high level of chamomile ration compared with control. Meanwhile, the concentrations of total lipids and cholesterol as well as the enzymes activity (GOT, GPT) were lower with the chamomile supplemented rations (G_2 and G_3) than those of control group (G_1) and the differences were significant respecting total lipid concentration only. The economic efficiency was improved with increasing the level of chamomile in calve rations (3.546, 3.570 and 3.641for G1, G2 and G3, respectively).

Keywords : Growth performance, calves, feed additives, chamomile flowers, feeding value, economic efficiency.

INTRODUCTION

Nutrition is a majori factor affecting ithe physiological and metabolic istatus of animals. The use of medicinali herbs and plants for human isiwell known since ithe old civilizations itime of ancienti Egyptians, Chinese and Greek. Using imedicinal herbs and seeds asi feed additives with ruminantsi seems to ibe globally a recent itrend. Many attemptsi were carried outito use theinatural materials isuch as medicinal iplants which are widely iaccepted as feed additives ito improve the efficiencyiof feed iutilization and productive iperformance of farm animalsisuch as sheep, goats, buffalosiand cows (Allam *et al*. 1999, Maged 2004, Shehata *et al*. 2007 and Shwereb, 2014). Using medicinaliherbs in animal rations was thei preventive solution to avoid the hazarded of side effects of using isynthetically chemical compounds. Rawi materials of these herbs and their extracts and drugs proved ito be always safe (Zeid, 1998, Tawfik *et al*. 2005 and Maged 2011)

Obviously, using medicinal herbs such as chamomile flowers in animal feeding had a positive effect on productive performance, improving the ruminal fluid environment and digestion coefficients as well as reducing the cholesterol and total lipids while triglycerides, protein and globulin in growing goats were increased as result of adding chamomile flowers to the diets (El-Hoseieny *et al*. 2000) and improve some the enzymes activity (GOT, GPT) in the blood (Maged 2004, and 2011), reducing the incidence of digestive disturbances such as diarrhea and bloat and consequently minimizing the mortality rate of the offspring (Shehata *et al*. 2007), improvement of immunity and detoxification of the afflatoxin (Tawfik *et al*. 2005)

Therefore, the main objectives of the percent study were to investigate the effect of using chamomile flowers at different levels (0, 5 and 10g /100kg BW/day) on productive performance of baladi calves., digestibility and feeding values of tested rations as well as rumen parameters and blood constituents.

MATERIALS AND METHODS

Animals and feeding trial:-

Twenty one growing male Baladi Calves, were chosen from El-Serw station herd with an average age 3-4 months and weighed on average 100 kg. They were used in a feeding trial that lasted for 360-d feeding period. Animals were divided into 3 equal groups (7 calves in each) according to their live body weight. They were then assigned at random to receive the three experimental rations using the randomized complete block design. The experimental basal ration was formulated from concentrate feed mixture (CFM) ,berseem hay (BH) and rice straw (RS). The chemical analysis of CFM, BH and RS are presented in Table (1).

Table 1. Chemical analysis of feed ingredients (% on DM basis).

Items	DM	% on DM basis					
		OM	CP	CF	EE	NFE	Ash
Concentrate feed mixture, CFM	92.40	93.26	15.35	16.65	3.40	57.86	6.74
Berseem hay, BH	90.34	85.30	13.50	26.35	2. 5	42.95	14.70
Rice straw, RS	90.30	82.70	2.40	38.50	1.56	39.24	17.30

The CFM consisted of 26% undecortecated cotton seed meal, 40% yellow corn, 27% wheat bran, 3.5% molasses, 2% limestone, 1% common salt and 0.5% minerals mixture.

Calves in the 1st group (G_1) were fed the basal control diet which was free from the experimental supplement, while those in the 2nd (G_2) and 3rd (G_3) groups were fed the control diet with daily supplementation of 5 , 10g of chamomile flowers/ 100 kg body weight (BW), respectively. Supplement of each treatment group was daily well mixed with the ingredients of CFM immediately before feeding. The experimental rations were offered twice daily in two equal portions at 8 a.m and 3 p.m. The nutrient requirements were changed according to body weight change which was determined every two weeks according to NRC (1996) recommendations. Drinking water was available at all times. Growth performance was followed during three periods (1-180 and 181-360 days) along with the whole period (1-360 days).

Digestibility trails and ruminal parameters:-

Three digestibilityitrails were conductedion 9 Rahmani rams (3 per group) toievaluate the feeding valuesiof the experimental rations. Eachidigestibility traililasted 35 days, of whichifour weeks wereiconsidered as preliminary periodifollowed by 7 days asicollection period. At the end of eachidigestibility trail, rumenifluid samples wereitaken from rams usingistomach tubeibefore feeding (0 time) and at 2,4 and 6 h post-feeding. Samplesiwere filtered through 3 layersiof gauze and pH-valuesiwere immediately determined. The rest of the samples were acidified and stored at -20°C until the determination of ammonia nitrogen (NH_3-N) concentration according to Conway (1957) method and volatile fatty acids (TVFA's) according to the technique described by Warner (1964). The total number of protozoa was counted using Foch-Rosenthal Chamber and microbial protein was estimated by the method of Shultz and Shultz (1970) in samples collected after 4 hrs of feeding.

Blood parameters:-

Blood samples were taken during the last day of the feeding trial from the jugular vein of growing calves at 4 hrs post-feeding. Blood serum samples were separated by centrifugation at 4000 rpm for 20 minutes, then frozen at -20 °C until analysis for total protein, albumin, globulin, urea, creatinine, total lipids, AST and ALT using kits and the methods reported by biochemistry (biomerieux) laboratory reagents and products.

Economic efficiency :

Economic efficiency was calculated as total output/ total input according to the local prices (where 1 ton of CFM cost 3050LE., BH 1200 LE., 1 ton RS 200 LE. and chamomile flowers 40LE. while 1 kg live body weight of male Baladi calves for 70 LE.

Chemical analysis:

The proximate analyses of feeds and feces for dry matter (DM), crude protein (CP), ether extracts (EE), crude fiber (CF) and ash contents were determined according to A.O.A.C. (1995) procedures.

Statistical analysis:

Data was statistically analysis's one-way analysis of variance using SAS (2003). The significant differences among means were done according to Duncan (1955).

RESULTS AND DISCUSSION

Growth performance:

The effect of different dietary treatments on growth performance of growing calves are presented in Table (2). Initial live body weight of all calves in the three groups (G_1, G_2 and G_3) were approximately similar. The obtained results revealed that the daily body gain (DBG) was significantly higher with the high level of chamomile diet (G_3) than that of low level-chamomile diet and control one during the first period of growth period, while the same trend occurred during the second period for DBG but the differences were insignificant among the experimental treatments.

During the whole period (1-360 days), the final body weight was significantly higher with the two tested rations compared with that of control which was free from chamomile supplement. Also, both total body gains and daily body gains were significantly higher with the high chamomile- ration (G_3) than those of the other treatments (G_1,G_2). These two values were insignificantly higher with the low chamomile-ration than those of the control one.

This positive effect was observed also by Abou-Ammo and El-Hosseiny (1999), El-Saadany *et al*. (2001) and Salem and El-Mahdy (2001) with some medicinal herbs and plants on final body weight, total body gain and daily body gain for growing lambs. Similarly, using some medicinal herbs (garlic, nigella sativa, fenugreek and chamomile) had positive effect on growth performance of growing goats and the highest value of daily gain was recorded with the chamomile group during suckling periods (83.82g and 72.57g, respectively) while, the lowest values ($p< 0.05$) were recorded with the control group (66.23g and 48.94g, respectively).

This positive effect may be attributed to the role of some medicinal herbs as anti-diarrhea, anti dysentery, anti-bacterial, protozoa acidly, expellant to worms and antiseptic which decreases losses of digested feed due to parasites and save digested nutrients to improve the production level (El-Baba, 1971 and Chevalier, 1996).

Table 2. Effect of experimental treatments on growth performance of Baladi calves.

Items	Treatments		
	G_1	G_2	G_3
First period (from 1-180 days)			
Initial LBW(kg)	100 ±0.74	103±0.46	99±0.51
Final LBW(kg)	235±0.64b	239±0.56a	240±0.48a
Total LBG (kg)	135±0.34^{b}	136±0.32a^{b}	143±0.45^{a}
Daily body gain(g)	750±3.68^{b}	755±3.48a^{b}	778±5.30^{a}
Second period (from 181-360day)			
Initial LBW (kg)	235±0.64	239±0.56	240±0.48
Final LBW (kg)	367±0.52	373±0.57	375±0.91
Total LBG (kg)	132±0.36	134±0.37	135±0.62
Daily body gain (g)	733±3.94	744±4.41	750±7.33
Overall mean (from 1-360 day)			
Initial LBW (kg)	100±0.74	103±0.46	99±0.51
Final LBW (kg)	367±0.52^{b}	373±0.57^{a}	375±0.91^{a}
Total LBG (kg)	267±0.36^{b}	270±0.56^{ab}	276±1.03^{a}
Daily body gain (g)	744±1.95^{b}	750±3.02^{ab}	766±5.68^{a}

a-b : Means in the same row followed by different letters differ significantly at (P<0.05).

Daily feed intake:

The daily feed intake by growing calves are summarized in Table (3). Calves consumed approximately similar quantity of DM intake as g/head, and g/ kg w0.75 since all calves had similar body weights.

Table 3. Effect of the experimental rations on daily feed intake of calves during the first and second periods of the experiment.

Items	Treatments		
	G_1	G_2	G_3
First period ,feed intake (g/h):			
CFM	2500	2500	2500
BH	2000	2000	2000
RS	1500	1500	1500
Total DM intake	6000	6000	6000
DM intake (g/kgw$^{0.75}$)	99.97	98.70	98.39
Second periods , feed intake (g/h):			
CFM	3700	3700	3700
BH	2500	2500	2500
RS	2000	2000	2000
Total DM intake	8200	8200	8200
DM intake (g/kgw$^{0.75}$)	97.79	96.61	96.22

The daily DM intake expressed as g/kg 0.75 during the first period was higher than that consumed during the second period in all treatments (99.97, 98.70, 98.39 vs. 97.79, 96.61, 96.22 for G1, G2 and G3, respectively). This could be mainly attributed to the higher dietary requirements during the 1st period to cover the fast growth and daily gain. Similar results were reported by Hassona *et al*. (1995) and Ahmed (2003) with growing sheep and goats,.

Rumen liquor parameters:

The pH values of the rumen liquor are presented in Table (4). The obtained results indicated that chamomile flower levels (0, 5 and 10 g/head/day) did not significantly affect Ruminal pH values over the four sampling times. This result agrees with those of Allam *et al* (1999) and Mohamed *et al* (2003) who reported that the pH value of rumen liquor was not significantly affected by medicinal plants supplementation such as chamomile flowers and *Nigella sativa* seeds. The maximum values of NH3-N in the rumen were recorded at 2 hrs post feeding in G1 (23.56 mg/100ml) compared with G2 and G3 (22.83 and 21.92 mg / 100ml, respectively), the difference was only significant between diets G1, and G3. Totally, the differences among dietary treatments in respect of ammonia-N concentrations were not significant over most sampling times. The same trend of NH3-N concentrations was obtained by Ahmed *et al*. (2000) and Zeid and Ahmed (2004) who reported that ruminal ammonia-N concentrations in the rumen of small ruminants reached a peak at 2 hrs after feeding. Yet, Abd El-Gawad (1984) and Hassona *et al*. (1995) found that maximum NH3-N concentrations were attained at 1 to 2 hrs. post-feeding with goats.

Table 4. Effect of the experimental treatments on ruminal fermentative parameters of Rahmani rams.

Items	Hours	Treatments		
		G1	G2	G3
pH value	0	7.06±0.08	7.04±0.11	7.00±0.12
	2	6.71±0.05	6.70±0.06	6.68±0.03
	4	6.19±0.07	6.24±0.05	6.20±0.08
	6	6.47±0.06	6.51±0.07	6.48±0.09
Ammonia-N (mg / 100 ml)	0	14.62±0.04	15.06±0.56	15.20±0.49
	2	23.56±0.46^{a}	22.83±0.39^{ab}	21.91±0.18^{b}
	4	23.46±0.41	23.26±0.70	22.86±0.47
	6	22.48±0.06	21.87±0.50	21.61±0.45
TVFA,s (Eq / 100ml)	0	8.11±0.08	8.04±0.17	8.22±0.52
	2	10.07±0.32	10.23±0.12	10.41±0.10
	4	10.77±0.08^{b}	11.62±0.07^{a}	11.85±0.06^{a}
	6	10.52±0.09	10.92±0.11	11.41±0.15

a-b : Means in the same row followed by different letters differ significantly at (P<0.05).

Mean values of total VFA,s are presented in Table (4) and indicated that the differences among the dietary treatments were almost non significant over most sampling times except that the values of the two tested rations were significantly higher than that of control only at the 4 hrs.. In this respect, ruminal total VFA,s concentrations at 6 hrs post-feeding were improved by 31.83% with chamomile treatment (11.39 ml Eq/100ml) compared with the control diets (8.64 ml Eq / 100 ml) as recorded by (Allam *et al*., 1999). In the present study, the highest values of TVFA,s concentrations were found at 4 hrs. post feeding which was reflected on lowering pH values at that time. Similar results were obtained by Ahmed *et al*. (2001).

Results of total number of protozoa and microbial protein concentration are presented in Table (5). It could be observed that total number of protozoa in rumen liquor was insignificant improved by the tested treatments over the two sampling times (0 and 4hr) post feeding. Microbial protein content was significantly improved in both chamomile supplemented rations (G2 and G3, respectively) compared with the control one with 4 hr-sampling time only. Similar results were observed by Maged (2004) and Ibrahim *et al*. (2007) using chamomile and chufa tubers in diets of small ruminants. In addition, Tawfik *et al*. (2005) found that the content of microbial protein was improved by about 14.2% with chamomile supplemented group compared with their control and this may be attributed to the regulatory action of medicinal plants on NH3-N concentration in the rumen as reported by Allam *et al* (1999) and Mohamed *et al*. (2003) and consequently maintaining the optimal environment for protozoa and other micro-organisms which gave high level of microbial protein synthesis in the rumen. Finally, the results herein agree with those of Wallace and Newbold (1992) who mentioned that feed additives might improve ruminal fermentation by increasing bacterial activity, which in turn increases degradability of lignocelluloses tissues and flow of microbial protein from the rumen to the lower gut.

Table 5. Effect of the experimental treatments on total number of protozoa and ruminal microbial protein of Rahmani sheep.

Items	Hours	Treatments		
		G1	G2	G3
Protozoa ($x10^6$)	0	0.411±0.03	0.420±0.04	0.432±0.02
	4	0.762±0.03	0.830±0.02	0.840±0.01
Microbial protein	0	0.336±0.02	0.340±0.03	0.338±0.01
(g / 100 ml)	4	0.576±0.03b	0.677±0.01a	0.684±0.02a

a-b : Means in the same row followed by different letters differ significantly at (P<0.05)

Blood parameters:

Data of some blood parameters of calves fed the experimental rations are presented in Table (6). Results indicated that most tested blood parameters were not significantly affected by the tested experimental rations. Yet, the hemoglobin value tended to be significantly increased with the two tested rations in comparison with the control one. Also, total protein and globulin concentrations were insignificantly higher with the low chamomile-ration and significant higher with the high chamomile-ration, compared to those of the control. The data presented in Table 6 indicated that lipids values were insignificantly lower with the level of supplement and significant lower with the high level one than that of control which was free from the experimental supplement. In an earlier study (Shehata *et al*. 2004) found that chamomile caused an increase in the concentrations of Hb, RBC,s , WBC,s and MCHC.

El-Hosseiny *et al*. (2000) studied the effect of using some medicinal plants as feed additives in goats rations and found that serum total protein and globulin concentrations were higher with the chamomile treatment (60 mg/ kg BW) compared with the other herbs (*Nigella sativa*, garlic and fenugreek) or the unsupplemented diet.

Table 6. Effect of experimental rations on some in blood parameters of Baladi calves .

Items	Treatments		
	G1	G2	G3
Hemoglobin (Hb), g/ dl	$11.0±0.33^b$	$12.20±0.30^a$	$12.50±0.20^a$
Hematocriate (Hct),%	33.62±0.85	36.30±1.43	33.55±2.03
Red blood cells (RBC,s $x10^6$ ul	10.65±0.70	10.73±0.22	11.65±0.45
Total protein g/ 100ml	$7.16±0.08^b$	$7.38±0.09^{ab}$	$7.58±0.07^a$
Albumin (A), g/ 100ml	2.73±0.06	2.76±0.08	2.81±0.13
Globulin (Gl), g/ 100ml	$4.43±0.03^b$	$4.62±0.03^{ab}$	$4.77±0.06^a$
Urea-N, mg/ 100ml	16.65±0.86	17.30±0.65	18.20±0.60
Glucose, mg/ 100ml	60.63±1.65	62.31±1.40	63.0±0.57
Total lipids, mg/ 100ml	$391.65±0.80^a$	$370.33±6.02^{ab}$	$350.0±10.40^b$
Cholesterol, mg/ 100ml	83.70±2.04	80.20±2.06	78.75±0.92
Bilirubin, mg/ 100ml	0.24±0.03	0.23±0.04	0.27±0.03
Alkaline phosphatase (u/l)	145.30±6.01	138.70±6.02	133.67±4.20
GOT, (u/l)	102.0±3.25	98.0±4.20	90.0±2.30
GPT, (u/l)	22.70±2.04	21.40±1.70	19.58±2.03

a-b : Means in the same row followed by different letters differ significantly at (P<0.05).

Zeid and Ahmed (2004) indicated that serum protein level was significantly reduced in goats as a result of chamomile flowers inclusion in the diet. Similarly, the same authors observed that total lipids and cholesterol concentrations were lower significantly ($P<0.05$) with using both *Nigella sativa* and chamomile compared with the control. Moreover, Maged (2011) reported that serum protein and globulin concentration improved while the concentration of cholesterol and the activity of ALT and AST were decreased as the result of using some medicinal herbs in rations of dairy goats.

Generally, the obtained data showed that most blood profile was slightly differed among the dietary treatments, though some differences were significant but all values were within the normal range as reported by Kaneko (1989), Abdelhamid *et al*. (1999c), Ahmed (1999), Gabr *et al*. (2003), Shehata *et al*. (2003) and Sadick (2004) with both sheep and goats.

Digestibility and feeding values:

The obtained data in Table (7) indicated that the effects of the experimental rations on digestibility of DM, CF and CP and feeding value (TDN and DCP) were significant. Results indicated also that the highest values in digestion coefficients of all nutrients were recorded with the high level of chamomile-diet (G3) followed by the lower level of chamomile (G2) and finally, the lowest values were recorded for the control treatment (G1).

Table 7. Digestion coefficients and feeding values of experimental rations with Rahmani rams.

Items	Treatments		
	G_1	G_2	G_3
Digestion coefficients %:			
DM	67.02±0.51^{b}	68.30±0.30^{b}	70.0±0.55^{a}
OM	70.32±0.45	71.48±0.27	72.46±0.83
CF	60.52±1.35^{b}	62.35±0.63^{ab}	65.20±0.40^{a}
CP	71.53±0.40^{b}	72.80±0.54^{ab}	73.70±0.88^{a}
EE	77.35±0.54	79.20±0.23	80.50±0.46
NFE	72.89±0.43	75.45±1.12	76.20±0.75
Feeding values (%) :			
TDN	67.26±0.38^{b}	68.80±0. 48^{a}	69.80±0.50^{a}
DCP	9.01±0.05^{b}	9.26±0.06^{a}	9.41±0.10^{a}

a-b : Means in the same row followed by different letters differ significantly at (P<0.05).

The positive effects of chamomile flowers on digestion coefficients were also observed by El-Saadany *et al*. (1996), Aboul-Fotoh *et al*. (1999), Allam *et al*.(1999), Zeid and Ahmed (2004). These findings may suggest that those supplements render the feeds to be more available for utilization, either by positively affecting the population of microflora or improving feed utilization through slowing the rate of passage of feed through the digestive tract which is reflected in better absorption (Zeid, 1998).

Similarly, the TDN and DCP% of tested diets were improved with increasing the level of chamomile (5, 10 g/head/day) compared with those of control values. The differences in TDN and DCP between G2 and G3 were not significant. The results are in line with those reported by Abdelhamid *et al*. (2004) who showed that most digestion coefficients and feeding values were higher as a result of using chamomile flowers in diets of Rahmani sheep, in comparison with the unsupplemented one.

Economic efficiency :

Economic efficiency(EE), estimated as price of gained weight divided by cost of feed consumed for the gain, are presented in Table (8).The price of feed intake per kg live body weight was higher with the control diet (G1) than that of G2 and G3 ones . The addition of chamomile (10g/h) to calves ration reduced feed coast / kg body weight gain from 19.74 to 19.22 LE. Therefore, the economic efficiency was improved with the increasing level of chamomile in calves ration (3.546, 3.570 and 3.641 for G1, G2 and G3, respectively). The economic efficiency was improved for the two chamomile supplemented rations (G2 and G3) by 0.67 and 2.68%, respectively compared with G1. Similar results were observed by El-Saadany *et al*. (2003) who recorded that using some medicinal herbs (Nigella sativa and chamomile) as feed additives in cow ration increased the economic return by about 21 and 23%, respectively than the control.

Table 8. The effect of using chamomile flowers in growing Baladi calves rations on economic efficiency.

Items	Treatment		
	G_1	G2	G_3
Daily feed intake (g/h)as fed:			
Concentrate feed mixture, ,g/h	3700	3700	3700
Berseem hay, g/h	2500	2500	2500
Rice straw, g	2000	2000	2000
Chamomile flowers, g	-	5	10
Cost of consumed feed, LE/h	14.685	14.705	14.725
Body gain, g /h.	744	750	766
Price of weight gain, LE/h	52.08	52.50	53.62
Feed cost/ kg gain, LE/h	19.74	19.61	19.22
Economic efficiency, %	3.546	3.570	3.641

CONCLUSION

It could be recommended to add 10g chamomile flowers / 100kg BW/ head /day in the growing Baladi calves diet led to an effective improvement in digestibility and feeding values of the diets, growth performance without any adverse effects on rumen and blood metabolic parameters.

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تأثير الإضافة الغذائية لزهور البابونج علي الهضم و الأداء الإنتاجي في العجول البلدي

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أجري هذا البحث لتقييم تأثير إضافة مستويين من أزهار البابونج الي عليقه العجول البلدي على النمو، و القيمة الغذائية وكذلك بعض قياسات الكرش والدم. واستخدم لذلك 21عجلا بمتوسط وزن الجسم الحي 100 كجم، و متوسط عمر 3-4 أشهر. تم تقسيم الحيوانات إلى ثلاث مجموعات (7 في كل مجموعة) وتم تغذية العجول وفقا NRC (1996) على عليقه أساسية مكونة من العلف المركز ودريس البرسيم وقش الأرز مع إضافة 0، 5 و 10جم من زهرة البابونج / لكل مائة كيلو جرام / يوم من وزن الجسم. وأجريت تجارب هضم استخدام 9 كباش لتقدير الهضم والقيمة الغذائية لعلائق التجربة. أظهرت النتائج:1- أن معاملات الهضم لجميع العناصر الغذائية وكذلك القيمة الغذائية تحسنت مع زيادة مستوى زهور البابونج في العلائق المختبرة وكانت الفروق معنوية في هضم كل من المادة الجافة، الألياف الخام و البروتين الخام وكذلك القيمة الغذائية كمركبات كلية مهضومة ، وبروتين خام مهضوم خاصة بين عليقه المستوي المرتفع لزهور الكاموميل وعليقة الكاموميل.2- وأظهرت نتائج قياسات الكرش مع الكباش أن تركيز الامونيا انخفض في علائق الإضافة مقارنة بالكنترول وكان الانخفاض معنوي مع المستوي الاعلي من إضافة الكاموميل فقط وذلك عند 2 ساعة بعد تناول الغذاء. وكانت الفروق غير معنوية من معاملات التجربة لباقي مواعيد سحب العينات (صفر ، 4 ، 6 ساعة بعد تناول الغذاء) وعند باقي مواعيد سحب العينة (صفر ،2 ،6) كانت الفروق غير معنوية بين المعاملات ، المجموعة الأولي (23.56مجم لكل 100 مل) مقارنة مع المجموعتين الثانية والثالثة (22.83 و 21.92 مجم / 100 مل، على التوالي).3- إضافة البابونج قد زاد معنويا من الأحماض الدهنية الكلية الطيارة عند الساعة الرابعة بعد الأكل. وسجلت أعلى عدد للبروتوزوا والبروتين الميكروبي كان في الساعة الرابعة مع المجموعة الثالثة وأدنى قيمة سجلت مع المجموعة الأولي.4- معدل الزيادة اليومية كانت أعلى مع زيادة مستوى البابونج أثناء فترات النمو المختلفة. فخلال الفترة الاولي معدل الزيادة اليومية في المجموعة الثالثة كان اعلي من المجموعة الأولي معنويا وبدون معنوية مع المجموعة الثانية. ولكن، معدل الزيادة اليومية خلال الفترة الثانية لم تكن الفروق بين المعاملات معنوية. وخلال الفترة بأكملها، كان وزن الجسم النهائي أقل بكثير في مجموعة الكنترول مقارنة مع كل من مجموعتي إضافة البابونج .5- استهلكت العجول كمية مماثلة تقريبا من المادة الجافة كجم/ راس، و جم / كجم حيز جسم تمثيلي لأن جميع العجول لها وزن جسم متماثل. وكانت كمية المادة الجافة المأكولة اليومية التي تم التعبير عنها جم / كجم حيز جسم تمثيلي خلال الفترة الأولى أعلى من تلك المستهلكة خلال الفترة الثانية في جميع المعاملات . ويعزى ذلك أساسا إلى ارتفاع الاحتياجات الغذائية خلال الفترة الأولى كانت كافية لتغطية النمو السريع والزيادة اليومية.6- ولم تتأثر معظم مكونات الدم المختبرة بشكل كبير بإضافة أزهار البابونج في العلائق المختبرة. في الوقت نفسه، فإن قيم الهيموجلوبين وكرات الدم الحمراء تميل إلى الزيادة في الحيوانات المحتوية عليقتها علي زهور البابونج و لكن الاختلافات كانت معنوية مع تركيز هيموجلوبين الدم وعلاوة على ذلك، كان البروتين الكلي و وتركيز الجلوبيولين اعلي معنوية مع زيادة كمية زهور البابونج في العليقة مقارنة بالمجموعة الاولي (الغير محتوية علي زهور البابونج). في حين كان تركيز الدهون الكلية والكولسترول وكذلك نشاط أنزيمات الكبد أقل مع العلائق المضاف لها الكاموميل .وفقا لذلك، يمكن أن يوصى بإضافة 10جرام زهرة البابونج / 100 كجم وزن حي / راس / يوم في علائق العجول البلدي النامية لتحسين الأداء الإنتاجي ومعاملات الهضم والقيمة الغذائية في علائق الحيوانات النامية بدون أي تأثير عكسي على وظائف الكرش وقياسات الدم .