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INFLUENCE OF CHAMOMILE FLOWER AND SWEET BASIL BY-PRODUCTS INCLUSION IN SHEEP RATIONS ON *IN VITRO* RUMEN CHARACTERISTICS AND THEIR PRODUCTIVE PERFORMANCE

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SUMMARY

Two experiments were conducted to study the effect of replacing berseem hay (BH) and wheat straw (WS) by chamomile flower and sweet basil by-products on growing lambs performance. The first experiment was carried out to determine the in vitro dry matter and organic matter disappearances to find out the best level of chamomile flower and sweet basil by-products (10, 20, 30 or 50% of DMI) to identify the best level for a subsequent in vivo digestibility and growth trials. Depending on the results of the first experiment, fifteen growing Ossimi cross breed lambs of 5 month old and 24 ±2.5 kg average live body weight were assigned into 3 similar feeding groups (five lambs each) to be fed one of the three experimental rations. First group was fed control ration consisting of 50% roughage (20% BH +30% WS) plus 50% concentrate feed mixture (CFM). The second group (CR50) was fed a ration consisting of 50% chamomile flower by-product plus 50% CFM. The third group (SB50) was fed a ration consisting of 50% sweet basil by-product plus 50% CFM. Rations were formulated to cover maintenance and growth requirements of the lambs according to NRC, (1994). Results of the first experiment indicated that the in vitro dry matter and organic matter disappearances (IVDMD and IVOMD) of lambs fed of CR50 and SB50 rations were the highest ($P < 0.05$) compared with control ration, respectively. Second in vivo experiment showed non-significant differences among the three tested rations (control, CR50 and SB50) at different time 0, 3 and 6 hrs post feeding were noticed for pH value, NH_3-N and TVF's concentrations in the rumen liquor. However significant ($P<0.05$) increase of apparent digestibility of DM, OM, CP and CF for lambs fed CR50 ration compared with those fed the control ration. The lambs fed CR50 and SB50 rations had higher ($p<0.05$) plasma protein and albumin values followed by those fed the control ration which recorded the lowest plasma protein and albumin values. In contrast, the lambs fed control ration had higher ($p<0.05$) plasma urea nitrogen than those fed CR50 and SB50 rations. The total body weight gain and average weight gain were higher ($p<0.05$) for lambs fed of CR50 and SB50 by about 20, 15.29% and 19.67, 14.75 %, respectively compared to lambs fed of control ration. The lambs received ration replacement with chamomile flower by-product (CR50) grew faster than those received sweet basil by-product (SB50) and control rations. Lambs of group fed CR50 ration recorded the highest ($p<0.05$) DM, TDN and DCP intake and as well feed efficiency ($p<0.05$) compared to SB50 and control rations.

In conclusion, herbal plant by-products (CR and CB), can partially replace berseem hay and wheat straw in growing lamps rations with useful performance and metabolic responses.

Keywords**: **Chamomile by-product, basil by-product, in vitro, nutrients digestibility, growth performance, lambs

INTRODUCTION

Herbs and their extracts were already used thousands years ago in Mesopotamia, Egypt, India, China and Greece, where they were appreciated for their specific aroma and various medicinal properties, Greathead *et al.* 2003. Today, the medicinal plants are grown in several areas of Egypt especially in villages of Fayoum and Beni Sueif Governorates. Attempts to use the natural materials as alternative growth promoters such as medicinal plants are widely accepted, the total cultivated area with medicinal and aromatic plants reached 63347 feddans and produce around 100690 ton/year, Agricultural Economics, 2007.

Chamomile (*Matricari arecutita* L.) and Basil (*Ocimum basilicum* L.) are widely used as garnish and are used for different medicinal purposes in folklore medicine of Egypt. They are important medicinal and aromatic plants. They have strong antimicrobial and antioxidant properties and significant nutritional content of minerals, phenols and carotenoids, Ozcan *et al.* 2005; Suhaj, 2006. Chamomile commonly known as German chamomile, chamomillae, Hungarian chamomile, Matricaria flowers, pinheads, sweet false chamomile, true chamomile, wild chamomile and Babuna, WHO, 1999. The plant belongs to the daisy (Asteraceae) family and the flowers have a characteristic herbaceous fragrance.

The European Herbal Infusions Association 2012, demands that chamomile used for infusions may contain only a technically unavoidable proportion of stems and leaves besides the chamomile inflorescences. The European Pharmacopoeia postulates that dried chamomile inflorescences should contain 4 ml kg−1blue essential oil and a minimum of 0.25% apigetrin, Ph. Eur., 2011. The flowers of chamomile contain the blue essential oil from 0.2 to 1.9% which finds a variety of uses, Mann and Staba 1986. It is mainly used as an anti-inflammatory and antiseptic, also antispasmodic and mildly sudorific, Mericli, 1990.

Sweet basil belongs to the Lamiaceae family, is an enjoyable smelling perennial shrub which grows in several counties all over the world, Akgul 1993 and Bariaux *et al.* 1992. Basil is used for the commercial seasoning. It is carachterized by the presence of essential oils and their compositions determine the specific aroma of plants and the flavour of the condiments. Many species of aromatic plants belonging to the Lamiaceae family grow wild in the Mediterranean basin, Martins *et al.* 1999; Sanda *et al.* 1998; Marotti *et al.* 1996 and Akgul, 1989.

Some ingredients of the volatile oil distilled from the basil herb, such as linalool, 1, 8-cineole, eugenol, or camphor, show documented biological activity. Linalool is the dominant compound of the oil derived from European basil varieties, Dzida 2010; Seidler-Łożykowska and Król 2008; Sifola and Barbieri 2006 and Marotti *et al.* 1996.

The use of plants in medicine is an age-long practice in various parts of the globe for both preventive and curative. Today, it is estimated that about 80% of the world population relies on botanical preparations as medicine to meet their health needs, Ogbera *et al.* 2010.

Many studies have established that basil leaves extracts have potent antioxidant, anti-aging, anticancer, antiviral, and antimicrobial properties, Chiang *et al.*, 2005; Bozin *et al.,* 2006; Manosroi *et al.,* 2006; Almeida *et al.*, 2007 and Akujobi *et al.*, 2010.

The leaves of sweet basil possess good antioxidant as well as anti-stress potentials in experimental animals. Consumption of basil or basil oil has been associated with a reduction in total cholesterol, low-density lipoprotein and triglyceride, Hicham *et al.*, 2009 and Sethi *et al.,* 2003.

The main objectives of this work, in this context, were to investigate the effect of replacing berseem hay and wheat straw by chamomile flower and sweet basil by-products on the *in vitro* dry and or organic matter disappearances, rumen activity, nutrients digestibility and productive of growing lambs.

MATERIALS AND METHODS

The first experiment:

The first experiment was carried out at the laboratory of Animal Production Department, Faculty of Agriculture, Fayoum University, to determine *in vitro* dry matter and organic matter disappearances to verify the effect of different levels of chamomile flower and sweet basil by-products to identify the best level for the subsequent *in vivo* digestibility and growth trial. Concentrate feed mixture (CFM) plus berseem hay (BH) and wheat straw (WS) at ratio of (50%, 20% and 30% on DM basis respectively) which was a control ration. Furthermore, eight levels of chamomile flower and sweet basil by-products were included to replace 10, 20, 30 and 50% of berseem hay and wheat straw together. The *in vitro* technique developed by Tilly and Terry 1963 and Modified by Barnes 1969 was applies.

The second experiment:

The second experiment was carried out at Animal Production Farm, Faculty of Agriculture, Fayoum University. The objective of this study was to investigate the effect replacement of berseem hay (BH) and wheat straw (WS) by chamomile flower and sweet basil by-products (in the expense of dry matter intake) rations on performance of growing lambs. Fifteen growing Ossimi cross breed lambs of 5 month old and 24±2.5 kg average live body weight were used. Lambs were assigned into 3 similar feeding groups (5 lambs each) to be fed one of the experimental rations. The three groups were assigned randomly to three dietary treatments (Table 1), control, CR50 and SB50, control ration consisted 50% roughage (20% BH +30% WS) plus 50% concentrate feed mixture (CFM), CR50 consisted 50% chamomile flower by-product plus 50 % CFM, while SB50 consisted 50% sweet basil by-product plus 50 % CFM. Rations were formulated to cover maintenance and growth requirements of the lambs according to NRC, 1994. Lambs of each group were kept in separate shaded pen and adapted for the tested rations for 2 weeks before the start of the feeding trial. Experimental rations were fed in two equal meals while water was continuously available. Feeding requirements were adjusted every two weeks according to changes of animal's body weight. At the beginning of feeding trial, all animals were individually weighed, thereafter biweekly in the morning before drinking and feeding throughout the experimental period.

Table 1. Formula of the experimental rations used in feeding trial, on dry matter basis

Item	Control	CR10	CR20	CR30	CR50	SB10	SB20	SB30	SB50
CFM	50	50	50	50	50	50	50	50	50
BH	20	15	10	5	0	15	10	5	0
WS	30	25	20	15	0	25	20	15	0
Chamomile by-Product (CR)	0	10	20	30	50	0	0	0	0
Sweet Basil by-Product(SB)	0	0	0	0	0	10	20	30	50

Control: 50% Concentrate feed mixture +20% berseem hay +30% Wheat straw.
CR10: Chamomile by-product 10% SB10: Sweet Basil by-products 10%
CR20: Chamomile by-product 20% SB 20: Sweet Basil by-products 20%
CR30: Chamomile by-product 30% SB 30: Sweet Basil by-products 30%
CR50: Chamomile by-product50%SB 50: Sweet Basil by-products 50%

At the end of the feeding trail, digestibility trail was conducted by using 3 mature lambs from in each trail group. Digestibility trail consisted of 14 days as a preliminary period followed by 5 days as a collection period.

Sampling:

Feces were collected in the morning and the urine was collected for each lamb in glass bottles with 1 ml /5% sulphoric acid (H_2SO_4). Samples from feeds were used and execrated feces were dried 6 hrs after feeding on the last day of trail and oven dried at 65 ^{o} C for 24 hrs to determine daily dry matter intake (DMI). While the rumen liquor was collected from lambs by using stomach tube. Before feeding in the morning (zero time), then at 3 and 6 hours after feeding. Samples 50 ml/lamb were immediately filtered by 4 layers of cheesecloth. Ruminal pH was immediately determined before rumen liquor was stored with a digital pH meter, concentration of NH_3-N was immediately determined using micro-diffusion method of Conway 1963. The rest of the samples were frozen for later determination of total volatile fatty acids (TFV's) by steam distillation according to Warner 1964.

Blood samples were taken two times at the beginning and at the end of the feeding trial from the same animals of digestibility trails from the jugular vein of three animals of each group at 3 hrs after morning feeding. The blood samples were centrifuged (3000 rpm for 5 min), then plasma samples were transferred into clean dried glass vials and stored in deep freezer at -20^{o} C for subsequent specific chemical analysis, for total protein and albumin according to Armstrong and Carr 1964 and Doumas *et al.* 1971, respectively. Globulin value was calculated by the differences between total protein and corresponding value of albumin. Triglycerides were determined according to method of Burtis *et al.* 2006. Urea was determined by the method of Coulombe and Favrean 1963.

Statistical Analysis:

Data of the digestibility trial, rumen parameters and some blood parameters were analyzed using one-way classification, ANOVA procedure by computer program of SPSS 2008, and the differences between means were tested using Duncan's new multiple test, Duncan 1955. The new least significant difference (LSD) was used when the treatments effect was significant Steel and Torrie, 1980. Data of growth performance and feed efficiency were adjusted for initial body weight, using ANCOVA.

RESULTS AND DISCUSSION

Chemical composition of ingredients and the tested rations:

Formulation of the experimental rations used in feeding trails are presented in Table (1). The control ration consisted of 50% CFM + 20% berseem hay+ 30% wheat straw, Then the chamomile flower and sweet basil by-products levels replaced 10, 20, 30 and 50% of berseem hay and wheat straw (CR10,CR20, CR30, CR50 and SB10, SB20,SB30, SB50). Chemical composition of chamomile flower and sweet basil by-products, concentrate feed mixture, berseem hay, wheat straw and tested rations are presented in Table (2 and 3). Chamomile flower by-product contained more crude protein, ether extract and nitrogen free extract while sweet basil by-product had less crude protein, ether extract and nitrogen free extract compared to chamomile flower by-product. The tested rations and the control one have nearly similar chemical composition despite the different levels of chamomile flower and sweet basil by-products.

Table 2. Chemical composition % of ration ingredients

Item	DM	OM	CP	EE	NFE	CF	ASH	GE MJ / Kg DM
CFM*	90.82	91.07	16.61	3.75	53.98	16.73	8.93	18.197
BH	91.2	88.35	13.96	2.95	39.88	31.56	11.65	17.774
WS	92.54	87.54	3.42	1.66	43.18	39.28	12.46	16.991
CR	90.99	87.92	12.85	3.57	43.63	27.87	12.08	17.619
SB	89.75	85.73	9.65	2.07	40.19	33.82	14.27	17.0104

DM: Dry matter, **OM**: Organic matter, **CP**: Crude protein, **EE**: Ether extract, **NFE**: Nitrogen free extract and **CF**: Crude fiber. **CR:** Chamomile by-Product **SB:** Sweet Basil by-Product

*Concentrate feed mixture consisted of 24% undecorticated cotton seed meal, 31% yellow corn, 33% wheat bran, 5% linseed meal, 3.5% molasses, 2.5% limestone, 1% common salt.

Table 3. Effect of Chamomile and Sweet Basil by-products replacement on *in vitro* dry and organic matter disappearance (IVDMD and IVOMD) of formulated rations

Item	DM	OM	CP	EE	NFE	CF	ASH	IVDMD%	IVOMD%
Control	91.41	89.47	12.12	2.96	47.92	26.46	10.53	39.54^{c}	42.85^{c}
CR 10	91.32	89.46	12.54	3.09	48.13	25.71	10.54	42.18^{b}	45.25^{b}
CR 20	91.24	89.46	12.96	3.22	48.34	24.95	10.54	45.64^{ab}	46.09^{b}
CR 30	91.15	89.46	13.37	3.34	48.55	24.20	10.54	45.99^{ab}	51.37^{ab}
CR 50	90.91	89.50	14.73	3.66	48.81	22.30	10.51	47.55^{a}	56.24^{a}
SB 10	91.20	89.25	12.22	2.94	47.79	26.30	10.75	40.28^{c}	44.71^{c}
SB 20	90.99	89.02	12.32	2.92	47.65	26.14	10.98	41.22^{b}	46.65^{b}
SB 30	90.78	88.80	12.41	2.89	47.52	25.98	11.20	41.98^{b}	47.34^{b}
SB 50	90.29	88.40	13.13	2.91	47.09	25.28	11.60	45.19^{ab}	50.04^{ab}
±SE	0.05	0.31	0.17	0.03	0.84	0.04	0.32	1.24	1.33

CR:Chamomile by-product, **SB**: Sweet Basil by-products **±SE**: standard error

a, b and c means at the same row with different superscript are significantly (P<0.05) different.

The first experiment: (In vitro dry matter and organic matter disappearances):

Data of Table (3) showed gradual increase in the *in vitro* dry matter (IVDMD %) and organic matter (IVOMD %) degradability with increasing level chamomile flower and sweet basil by-products (10, 20, 30 and 50%) as replacement of berseem hay and wheat straw inclusion in the rations than that of the control. The optimum levels of CR and SB by-products replacement were completely fed of berseem hay and wheat straw (100%). The highest (P < 0.05) values of IVDMD % and IVOMD % were CR50 and SB50 rations respectively compared with control ration.

This may be due to enhancing the microbial activity by a certain level of the essential oils remained in the medicinal plants leaves of chamomile flower and sweet basil by-products, due to increase in microbial colonization of feed particles due to higher CP, EE and NFE contents of chamomile flower by-product than those of berseem hay and wheat straw (Table 2). It is worth to mention that, chamomile flower by-product (CR 50%) inclusion in the rations showed superiority over sweet basil by-product (SB 50%) for improving IVDMD % and IVOMD %. The present results are in line with Aboul-Fotouh *et al.* 1999. They observed that IVDMD of tested rations were improved by *Cymbopogon citrates* and leaves of *Eucalyptus globulus* supplementation compared with the control ration.

The Second experiment (In vivo study):

Rumen fermentation parameters:

The replacement of berseem hay and wheat straw by chamomile flower and sweet basil by-products (CR50 and SB50) led to insignificant (P<0.05) increases in all ruminal basic parameters (e.g. pH, NH_3-N and TVF's) (Table, 4). In-significant differences among the three tested rations (control, CR50 and SB50) at different time 0, 3 and 6 hrs post feeding were noticed for pH value, NH3-N and TVF's concentrations in the rumen liquor (Table 4). The values of pH started high then decreased at 3 hrs then tend to increase at 6 hrs after feeding NH_3-N and TVF's concentrations started low and then increased at 3 hrs then tend to decreased at 6 hrs after feeding.

Table 4. Effect of Chamomile flower and Sweet basil by-products replacement on lamb's rations on some rumen fermentation parameters

Item	Control	CR50	SB50	Mean	±SE
pH value					
Zero time	6.62	6.50	6.55	6.55	0.05
3 hours	5.28	5.34	5.39	5.33	0.08
6hours	5.88	5.80	5.82	5.83	0.05
NH3-Nconcentration, mg/100 ml					
Zero time	13.51	13.97	14.24	13.90	1.02
3 hours	17.33	17.80	17.78	17.63	0.20
6hours	14.47	14.61	14.64	14.57	0.42
TFA'sconcentration, meq/100 ml					
Zero time	7.72	7.88	7.57	7.72	0.72
3 hours	10.84	10.87	10.60	10.77	0.64
6hours	8.32	8.27	8.30	8.29	0.10

Control: 50% CFM+20% berseem hay +30% wheat straw, **CR50:** 50% CFM+ 50% Chamomile by-product and **SB50:** 50% CFM+ 50% Sweet Basil by-product.

Nutrients digestibility and nutritive value:

Nutrients digestibility and nutritive value showed in Table (5) which manifest significant (P<0.05) increase of apparent digestibility coefficients of DM, OM, CP and CF for lambs fed chamomile flower by-product containing ration (CR50) compared with those fed the control ration and SB50 while EE and NFE digestibilities were not changed among all groups. This may be imputed to the chamomile flower by-product which included essential oils that enhanced nutrients digestibility as was supported by the results in Table (3). These results are in agreement with those reported by Allam *et al.* 1999; El-Saadany *et al.* 2003 and Mohamed and Ibrahem 2003. Mericli 1990, who mentioned that the chamomile acts as ant-idusentaria bacteria or worms, which decrease losses of digested feed due to parasites and save digested nutrients to improve production. Also, Abou-Zied 1988 indicated that effective substances in chamomile act as an antiseptic against the antagonistic flora and stimulate the digestive enzymes and processes. El-Garhy 2012 showed that buffaloes fed rations containing chamomile by-product showed the highest values of digestibility coefficients (P<0.05) and feeding values compared with control ration.

The nutritive values of the experimental rations as total digestible nutrients (TDN) and digestible crude protein (DCP) are shown in Table (5). The lambs fed (CR50) showed the highest (P<0.05) value of TDN followed by lambs fed (SB50) then lambs fed the control ration which recorded lowest values for TDN and DCP. On the other hand, DCP values did not significantly differ between the CR50 and SB50 rations while control ration had the lowest value. This may be imputed to the increase in total bacteria count with increasing level of chamomile flower by-product which tended to increase nutrient digestibility parallel with increase biosynthesis of microbial protein, which led to increase CP digestibility and rations DCP content.

Table 5. Nutrients digestibility and nutritive values of the experimental rations

Item	**Control**	**CR50**	**SB50**	**±SE**
Digestibility coefficients%				
DM	60.34^{b}	64.80^{a}	62.35^{b}	2.19
OM	64.15^{b}	67.53^{a}	66.95^{ab}	2.04
CP	63.71^{c}	73.60^{a}	67.61^{b}	2.23
EE	68.81	68.24	68.55	2.30
CF	54.09^{b}	60.71^{a}	57.32^{b}	5.15
NFE	66.31	69.12	70.15	2.01
Nutritive values%				
TDN	59.56^{b}	62.82^{a}	62.61^{a}	1.93
DCP	7.72^{b}	10.84^{a}	8.86^{a}	0.56

TDN: Total digestible nutrients, **DCP**: Digestible crude protein, **Control:** 50% CFM+ 20% berseem hay +30% wheat straw, **CR50:** 50% CFM+ 50% Chamomile by-product and **SB50:** 50% CFM+ 50% Sweet Basil by-product.
a, b and c means at the same row with different superscript are significantly (P<0.05) different. **±SE**: standard error

Blood parameters:

The lambs fed CR50 and SB50 ration had higher (p<0.05) plasma protein and albumin values followed by those fed the control ration while lambs fed control ration recorded the lowest plasma protein and albumin values (Table 6). This may be due to a higher crude protein (CP) content of chamomile flower by-product (Table 2) beside higher crude protein (CP) digestibility by lambs fed (CR50) ration compared to other tested ration, control and SB50 (Table 5). In contrast, the lambs fed control ration had higher (p<0.05) plasma urea nitrogen than those fed rations containing chamomile flower and sweet basil by-products (CR50 and SB50) according to Lewis *et al.* 1957. In addition, there were no significant differences between all tested rations in plasma globulin ratio and triglycerides concentrations. The increase in serum globulin may possible due to development immunity against infection Metwally 1994. This reflects the positive effect of CR50 and SB50 on the metabolic process as well as animal's health. It is worth mentioning that all measured blood plasma parameters among the experimental lambs groups are within the normal physiological range for healthy animals. These results agree with those of El-Hosseiny *et al.* 2000, who found that serum total protein and globulin were significantly higher as results of presence of medicinal herbs and plants (especially chamomile) in goats rations. Generally, the obtained values are within the normal range reported by Kaneko 1989, for healthy goats and in line with findings of Zeid 1998, who used medicinal herbs and plants in goat rations.

Table 6. Blood parameters of lamb's fed the tested rations

Item	Control	CR50	SB50	±SE
Total protein (g/dl)	6.77^{b}	7.11^{a}	6.82^{a}	0.237
Albumin (g/dl)	3.62^{b}	3.51^{a}	3.63^{a}	0.127
Globulin (g/dl)	3.15	3.60	3.19	0.229
A/G ratio	1.15	0.97	1.14	0.098

Triglycerides (mg/dl)	47.33	48.74	49.19	3.556
Urea nitrogen(mg/dl)	24.77[a]	30.98[b]	25.76[b]	2.454

A/G: Albumin/ Globulin ratio.±SE: standard error
a, b and c means at the same row with different superscript are significantly (P<0.05) different.

Growth performance and feed conversion:

The lambs received ration with chamomile flower by-product (CR50) grew faster than those received SB50 and control ration (Table7). The total body weight gain was higher (p<0.05) for lambs fed CR50 and SB50 by about 20 and 15.29%, while average weight gain was higher (p<0.05) for lambs fed of CR50 and SB50 by about 19.67 and 14.75 % compared to lambs fed of control ration, respectively. The increases in average daily body weight gain and total gain probably were due to additional metabolizable protein supplied by this source. This can occur through positive increase in metabolic processes to increase efficiency of protein utilization by increasing total blood serum proteins and albumin concentrations (Table 6) which led to increase anabolism processes for CR50 compared with SB50 and control rations. Regarding the feed intake, data in Table (6) clearly showed that lambs of group fed CR50 ration recorded the best (p<0.05) DM, TDN and DCP intake. On the other hand, results of feed efficiency expressed as the amount kg intake of DM, TDN and DCP to give one kg weight gai`n in Table (7) showed that the lambs of group fed CR50 ration revealed better feed efficiency (p<0.05) compared to SB50 and control rations. Improving feed efficiency of lambs fed CR50 ration may be mainly attributed to the higher daily gain and nutrients digestibility. These results agreed with those reported by Aboul-Fotouh *et al.* (1999)

Table 7. Productive performance of lamb fed different experimental rations during the feeding trail

Item	Control	CR50	SB50
Feeding period, day	210	210	210
Growth performance:			
Initial weight, Kg	24±2.05	24±2.33	24±2.79
Final weight, Kg	49.5±1.63	54.6±3.62	53.4±4.33
Total gain, Kg	25.5[b]±2.66	30.6[a]±2.89	29.4[a]±2.78
Daily gain, Kg	0.122[b]±0.051	0.146[a]±0.072	0.140[a]±0.045
Feed intake, Kg/h/d			
DM	1.140	1.177	1.176
TDN	0.70	0.73	0.72
DCP	0.085	0.095	0.089
Feed efficiency, Kg/Kg gain			
DM	9.34[a]	8.05[b]	8.41[b]
TDN	5.73[a]	5.00[b]	5.14[b]
DCP	0.73	0.58	0.67

a, b and c means at the same row with different superscript are significantly (P<0.05) different.
±SE: standard error

CONCLUSION

Finally, it can be concluded that replacing berseem hay and wheat straw by chamomile flower and sweet basil by-products for growing lambs rations seems to induce improvements in nutrient digestibility, body weight gain, growth performance and feed conversion.

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تأثير إستبدال مخلفات شيح البابونج والريحان الحلو في علائق الأغنام النامية علي تخمرات الكرش معملياً وأدائها الإنتاجي

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أجريت تجربتين في هذه الدراسة لمعرفة تأثير استبدال مخلفات شيح البابونج والريحان الحلو بدريس البرسم وتبن القمح على اداء الحملان النامية. التجربة الأولى كانت معملياً لتقدير معدل أختفاء الماده الجافة والماده العضوية لإيجاد أفضل مستوي استبدال من مخلفات شيح البابونج والريحان الحلو حيث كانت المستويات كالتالي ١٠، ٢٠، ٣٠، ٥٠ % كأستبدال من دريس البرسم وتبن القمح لكل مخلف علي حدى واعتماداً على نتائج التجربة الأولي اجريت التجربة الثانية (الحقلية) على الحملان النامية.

استخدم في التجربة الثانية ١٥ حولي أوسيمي خليط نامي (عمر ٥ أشهر متوسط وزنة ٢٤ كجم) وقسمت هذه الحيوانات عشوائياً إلى ثلاث مجموعات متماثلة (٥/مجموعة) لتتغذي علي العلائق التالية:

١- المجموعة الكنترول: غذيت على ٥٠% علف مركز+ ٢٠% دريس برسيم + ٣٠% تبن قمح.

٢- المجموعة الثانية CR50: غذيت على ٥٠% علف مركز+ ٥٠% مخلفات شيح البابونج.

٣- المجموعة الثالثة SB50: غذيت على ٥٠% علف مركز+ ٥٠% مخلفات الريحان الحلو.

تم تغذية الحملان طبقا لتوصيات NRC 1994 الخاصة بالإحتياجات الحافظة والنمولمده ٢١٠ يوم وفي نهاية التجربة تم تقدير معاملات هضم العناصر الغذائية المختلفة عن طريق إجراء تجربة الهضم وقياسات الكرش وتم أخذ عينات الدم في بداية ونهاية تجربة النمو.

وأظهرت النتائج ما يلي: تحسنت الماده الجافة المهضومة والعضوية معملياً للتركيزات المختلفة من مخلفات شيح البابونج والريحان الحلو وكانت أفضل التركيزات هي الاستبدال بنسبة ١٠٠% من دريس البرسيم و تبن القمح (٥٠ % من العليقة الكلية). وقد تم استخدام هذه التركيزات في التجربة الثانية (CR50, SB50). اظهر استبدال المخلفات فروق غير معنوية للعلائق الثلاثة المختبرة في قياسات الكرش (تركيز pH، تركيز نيتروجين الأمونيا ، الأحماض الدهنية الطياره) في الأوقات المختلفة عند (صفر، ٣ ،٦) ساعات من التغذية. سجلت المجاميع التي تغذت علي العليقة الثانية تحسناً معنويا في معاملات هضم الماده الجافة، المادة العضوية، البروتين الخام، الألياف الخام بالمقارنة بالمجموعة الثالثة والكنترول بينما لم يكن هناك فروق معنوية في معاملات هضم الدهن والكربوهيدرات الخام. سجلت أيضا المجاميع التي تغذت علي العليقة الثانية والثالثة زياده معنوية في القيم الغذائية (المركبات المهضومة الكلية، البروتين المهضوم) بالمقارنة بمجموعة الكنترولولكن كانت العليقة الثانية الأعلي في القيم الغذائية .

سجلت المجاميع التي تغذت علي العليقة الثانية والثالثة فروقاً معنوية في قيمة البروتين الكلي والالبيومين بالمقارنة بالكنترول التي سجلت أقل القيم. على العكس من ذلك فأن المجاميع التي تغذت على العليقة الكنترول سجلت معنوية أعلى في قيمة نيتروجين اليوريا بالمقارنة بالعليقة الثانية والثالثة. بينما لم يسجل الجلوبيولين ولا الجلسريدات الثلاثية أي فروق معنوية.

سجلت المجاميع التي تغذت علي العليقة الثانية CR50 والثالثة SB50 زياده معنويةفي الوزن النهائي بمقدار 15.29،20% ومعدل النمو اليومي بمقدار ١٩.٦٧ ، ١٤.٧٥ % بالمقارنة بالعليقة الكنترول على التوالي. سجلت مجموعةالحملانالتيغذيتعلى العليقةCR50 أكبر كمية مأكولة من المادة جافة ، المركبات الغذائية المهضومة والبروتين الكلي وأحسن كفاءةغذائية.

وطبقاً لظروف هذه التجربة يوصي باستبدال دريس البرسم وتبن القمح بمخلفات شيح البابونج والريحان الحلو في علائق الحملان الأوسيمي الخليطة لما لها من تأثيرات إيجابية على معاملات الهضم ، الكفاءة الغذائية ، معدل النمو وإداء الحملان.