

## **INFLUENCE OF *Majorana hortonsimas* BY-PRODUCT AS FEED SUPPLEMENTATION ON EWES MILK PRODUCTION AND THE GROWTH PERFORMANCE AND THEIR OFFSPRING**

**K.I. Mohamed<sup>1</sup>, A.H. Mohamed<sup>1</sup> and Safa Nady<sup>2</sup>**

*1- By-Products Research Department, 2- Sheep and Goat Research Department, Animal Production Research Institute, Agricultural Research Center, Giza, Egypt*

### **SUMMARY**

*This study was carried out to investigate the effect of *Majorena Hortonsimas* by-product (MHBP) as feed supplementation on digestibility, milk yield and their offspring performance. Fifteen ewes before lambing averaged 45.3 kg live body weight (LBW) and aged 3-4 years were divided randomly into three similar groups. The first ration (R1) consisted of concentrate feed mixture (CFM) (2% of live body weight) and been straw without feed supplementation as control group, whereas the second and third groups received the control ration with 50 or 100 gm /head/daily of *Majorena Hortonsimas* by-product (MHBP) as feed supplementation as group R2 and R3 groups, respectively.*

*Results showed that significant ( $P<0.05$ ) improvement in digestibility coefficients of OM; CP; CF; NFE and nutritive values as TDN and DCP for supplementation groups compared with control group. Group R3, showed the highest value for the digestion coefficients and nutritive value. Meanwhile there were no significant differences between R2 and R3 groups. Milk production was estimated by measuring the production of one day once a week for each ewe. Lambs were weighed at birth and afterwards every two weeks until weaning. The results showed that milk production was higher ( $P<0.05$ ) for R2 and R3 groups. Also, results showed that milk production was higher ( $P<0.05$ ) for R3 group as compare with R2 group during the first 8 weeks. Meanwhile, there were no significant differences between tested groups concerning birth weight. On the meantime the average body weight at the weaning was higher ( $P<0.05$ ) for R3 as compare with control group. Also, the average daily gain for lambs from birth up to weaning for R3 group was higher ( $P<0.05$ ) as compared with R1 group. In conclusion, *Majorena Hortonsimas* by-product (MHBP) supplementation to ewes rations could be recommended for lactating ewes rations which can improve ewes to enhance milk production and lambs growth.*

**Keywords:** *Majorena Hortonsimas* by-product; nutrient digestibility, milk yield, birth weight, average daily gain

### **INTRODUCTION**

Volatile oil industry products from Aromatic plants, represent one of the most promising industries during the last 20 years in Egypt. A varying quantities of agro-industrial afford valuable supplementary ingredients to be used in animal rations

---

*Issued by The Egyptian Society of Animal Production*

could be produced. Therefore, studies concerned with the potential supply, availability as feed, and nutritive value of these products enabling better utilization at small farm level are of prime importance for livestock development in Egypt. Aromatic plants by-products, remain after ethnic volatile oil distillation. Egypt had 55.000 feddan cultivated by aromatic plants produce approximately 100.000 Tons/year of by-products (Ministry of Agriculture, 2005) contained (DM basis) 81.32 to 87.54% crude protein 9.7 to 13.52% , ether extract 1.34 to 5.87%, crude fiber 22.56 to 32.50%, nitrogen free extract 23.67 to 46.24% and ash 4.7 to 12.34%. Wideneki *et al.* (1998). Some study evaluated the supplementation of aromatic plants by-products to calves ration ( Wojcik *et al.* , 1984), to cows ration (Tiwari *et al.*, 1996) and sheep ration (Djouvinov *et al.* , 1997 and Mohamed *et al.*, 2005).

The objective of this study was to evaluate effects of *Majorena Hortonismas* by-product (MHBP) as feed supplement on digestion coefficients, nutritive values, milk production of ewes and their offspring performance.

## MATERIALS AND METHODS

This study was carried out at Sids Experimental Research Station, Animal Production Research Institute, Agricultural Research Center (Bani Soaif Governorate). Fifteen ewes averaged 45.90 kg live body weight and aged 3-4 years, before lambing. Animal were allotted at random into three similar groups (5 animals each), and received one of the tested diets. The control group (RI), received the control ration, which composed of concentrate feed mixture (CFM)\* and been straw (BS). The tested groups were fed on control ration and BS plus *Majorena Hortonsimas* by-product (MHBP) supplementation at 50 or 100 g/head/day, for R2 and R3 groups, respectively. Animals were fed according to NRC, (1989) allowances for sheep. Fresh water was always available and animals were under veterinary care during the whole experimental period. Feed conversion was calculated and expressed in terms of DM (g), TDN (g) and DCP (g) required for producing one (kg) of milk. At the end of the study a simple economical cost evaluation was calculated for the tested diets according to the prevailing prices of feeds during the time of the experiment .

Three digestion trials were conducted with three mature Saeidi male sheep (average body weight 49.5kg) to determine rations nutrients digestion coefficients, nutritive values and some rumen liquor parameters of the previous experimental rations. Each trial lasted for two weeks as preliminary period followed by one week for feed intake determination and feed refusals sampling and feces ( as collection period). Animals were fed twice daily at 8.00 a.m. and 3.00 p.m. and refusal were recording every days. Daily feces were weighted, 10% sampled and analyzed. Fresh water was available and animals were under veterinary care. The chemical composition of ingredients used and experimental diets are presented in Table (1) .

### *Chemical analysis*

Representative samples of feeds and feces were air dried and kept for chemical analysis according to A.O.A.C.( 1999). The data were statistically analyzed to test the significance of treatment employing the analysis of variance producer according to Snedecor and Cochran (1980). Duncan's multiple range test was applied to test significant among means (Duncan, 1955).

## RESULTS AND DISCUSSION

**Chemical analysis, digestion coefficients and nutritive values:**

The chemical analysis of ingredients and calculated nutrients contents for experimental diets are presented in Table (1). The *Majorena Hortonsimas* by-product (MHBP) had slightly lower CP and NFE content with higher content of CF as percentage compared with different meals.

**Table 1. Chemical analysis of ingredients and calculated experimental diets**

Ingredients	Chemical analysis						
	DM	OM	CP	CF	EE	NFE	Ash
CFM	91.63	1.28	5.25	11.45	2.86	1.72	8.72
BS	90.52	87.64	4.45	3.38	1.64	8.17	2.36
MHM	0.12	80.59	18.56	20.72	2.16	39.15	19.41

**Digestibility coefficients and nutritive values:**

Digestibility coefficients and nutritive values for the experimental diets are presented in Table (2). Digestion coefficients of CF, and NFE for R2 and R3 groups, were significantly ( $P < 0.05$ ) higher as compared with control group. But digestion coefficients of DM, OM and CP for R3 group were significantly ( $P < 0.05$ ) higher as compared with the control group. Meanwhile, there were no significance differences between groups concerning digestion coefficient of EE. The improvement ranged between 7.23-11.84%; 6.12-11.60%; 4.74 – 7.81% ; 4.87-7.33% and 5.37-7.61% for CP, CF, NDF and NFE digestibility, respectively for R2 and R3 groups.

**Table 2. Digestion coefficients and nutritive values of experimental rations**

Items	Experimental rations		
	R1	R2	R3
Digestible coefficients			
DM	59.82 <sup>b</sup>	62.45 <sup>ab</sup>	64.18 <sup>a</sup>
OM	64.17 <sup>b</sup>	66.22 <sup>ab</sup>	67.56 <sup>a</sup>
CP	65.72 <sup>b</sup>	68.45 <sup>ab</sup>	70.28 <sup>a</sup>
CF	53.36 <sup>b</sup>	57.52 <sup>a</sup>	58.77 <sup>a</sup>
EE	79.33	80.22	81.18
NFE	71.52 <sup>b</sup>	74.72 <sup>a</sup>	77.28 <sup>a</sup>
Nutritive values			
TDN	61.46 <sup>b</sup>	65.24 <sup>a</sup>	67.28 <sup>a</sup>
DCP	8.54 <sup>b</sup>	9.00 <sup>a</sup>	9.37 <sup>a</sup>

a, ,b Means in the same raw having different significantly different ( $P < 0.05$ )

The nutritive values expressed as TDN and DCP were a reflection of the nutrients digestibility. The nutritive values for R2 and R3 groups were significantly ( $P < 0.05$ ) improved as compared with control group. These results are in agreement with those reported by Wojcik *et al.* (1984); Djouvinov *et al.* (1997) and Mohamed *et al.* (2005) who observed that the inclusion of some chamomile by-products (CC) within sheep rations, improved the digestibility and nutritive value. These results support the observations of Wideneki *et al.* (1998) and Mohamed and Ibrahim (2003) who mentioned that the improvement in rumen fermentation and nutritive values of the diets contained chamomile cake (CC) were due to the effective biochemical groups in the CC.

**Feeding trials:**

Data concerning milk yield are presented in Table (4) and Figures (1 and 2). The total milk yield TMY/kg obtained during first 8 weeks of the lactation period of ewes, were significantly ( $P<0.05$ ) increased in R2 and R3 and groups as compared to R1 group. On the mean time, there were no significant differences in TMY between R1 and R2 groups during the last 6 weeks of lactation period. As a consequence, significant differences in the total TMY were detected between R2 and R3 groups and control group during the last 6 weeks of lactation period. On the other hand the average daily milk yield (ADMY g/day), almost followed the same trend.

**Table 3. Effect of experimental rations on milk production**

Items	Experimental rations		
	R1	R2	R3
No. of ewes	5	5	5
Av. body W. kg	46.5	45.6	45.5
Milk yield kg			
First 8 weeks	23.8	27.00	30.00
Last 6 weeks	15.12	17.22	18.90
Av. daily Milk yield g			
First 8 weeks	425 <sup>c</sup>	480 <sup>b</sup>	535 <sup>a</sup>
Last 6 weeks	360 <sup>b</sup>	410 <sup>ab</sup>	450 <sup>a</sup>
Total Milk yield kg	38.20 <sup>b</sup>	44.22 <sup>ab</sup>	48.90 <sup>a</sup>
Av. DMY g	388 <sup>b</sup>	445 <sup>ab</sup>	493 <sup>a</sup>

a,b Means in the same raw having different significantly differ ( $P<0.05$ )

The ADMY g/h obtained during first 8 weeks of lactation period of ewes fed R2 and R3 rations were significantly ( $P<0.05$ ) increased as compared with R1 ration. Also, a higher ADMY during the last 6 weeks of lactation period, obtained from animal fed R3 ration (450g/day) whereas, the lower ADMY obtained from animal fed R1 ration (388 g / day).

On the meantime, the ADMY for the whole period (14 weeks) for the animals fed R2 and R3 diets were significantly ( $P<0.05$ ) higher than animal fed R1 ration. It was noticed that the supplementation with 50 or 100 g/head/ day of (MHBP) improved ewes performance. As a result to the improvement of ADMY, the TMY was increased by 9.20 and 18.0% for R2 and R3 groups, respectively than the control group during the whole lactation period. These results are in agreement with the findings of Wojcik *et al.* (1984) and Tiwari *et al.* (1996).

Data concerning the average body weight (BW) and average daily gain (ADG) for lambs from birth up to third month in the current study are shown in Table (5). The birth weight ranged between (3.0-3.50 kg). The highest birth weight was found with lambs of R3 group. On the meantime, the (ADG) for offspring from birth up to the first month for lambs of R2 and R3 groups, were significantly ( $P<0.05$ ) higher than lambs for R1 group. Also, the (ADG) for offspring from the first month up to the second month followed the same trend.

**Table 4. Effect of experimental rations on average daily gain of lambs**

Items	Experimental rations		
	R1	R2	R3
Birth weight , kg	3.25	3.00	3.35
Birth weight , kg w <sup>0.75</sup>	2.42 <sup>b</sup>	2.30 <sup>a</sup>	2.56
First month w kg,	7.10 <sup>b</sup>	7.50 <sup>ab</sup>	9.40 <sup>a</sup>
First month w kg, w <sup>0.75</sup>	4.10 <sup>b</sup>	4.50 <sup>ab</sup>	4.90 <sup>a</sup>
Av. daily gain g	161 <sup>B</sup>	185 <sup>ab</sup>	240 <sup>a</sup>
Second month w kg,	11.8 <sup>b</sup>	13.30 <sup>ab</sup>	15.20 <sup>a</sup>
Second month w kg, w <sup>0.75</sup>	5.77 <sup>b</sup>	6.83 <sup>a</sup>	6.53 <sup>a</sup>
Av. daily gain g	130 <sup>c</sup>	163 <sup>a</sup>	145 <sup>ab</sup>
Weaning w kg,	15.40 <sup>c</sup>	17.30 <sup>a</sup>	18.25 <sup>ab</sup>
Av. daily gain g	145	163	190

a ,b Means in the same raw having different significantly differ (P<0.05)

Meanwhile the body weight (BWt) of lambs at the first and second months of age for R3 group were significantly ( P<0.05) higher than those of R1 group lambs as a result to the improvement of ADG for lambs. On the mean time , there were no significant differences between R1 and R2 groups lambs concerning the BWt at the third month. Dietary (MHBP) supplementation had significant effects on average daily gain.

Data concerning the feed intake, feed efficiency and feeding costs were shown in Table (5). The higher intake of TDN and DCP recorded for animal fed R3 ration, was a result to the improvement of nutritive values related to the supplemented additive.

**Table 5. Effect of the experimental rations on the average feed intake, feed efficiency and feeding costs**

Items	Experimental rations		
	R1	R2	R3
Av. body weight kg	46.5	45.6	45.0
Av.daily milk yield g	388 <sup>b</sup>	455 <sup>ab</sup>	493 <sup>a</sup>
Av. Feed intake, g			
DMI g	1565	1630	1690
TDN g	962	1063	1146
DCP g	134	147	158
Feed conversion			
DM / kg milk	4.03 <sup>a</sup>	3.58 <sup>b</sup>	3.43 <sup>b</sup>
TDN / kg milk	2.48 <sup>a</sup>	2.34 <sup>b</sup>	2.33 <sup>b</sup>
DCP / kg milk	345 <sup>a</sup>	323 <sup>b</sup>	321 <sup>ab</sup>
Feeding cost			
Av. feed cost / head / day LE	1.30 <sup>a</sup>	1.40	1.50
Total feed cost during lactation period LE	127.4	137.2	147.0
Av. feed cost / kg milk	3.35	3.10	3.000

a ,b ,c Means in the same raw having different significantly differ (P<0.05)

Concerning the feed efficiency, results in Table (6) revealed that the values were 4.0, 3.58, and 3.43 kg DM intake / kg milk, 2.48, 2.34, and 2.33 kg TDN intake / kg milk, and 345, 323 and 321 g DCP intake / kg milk for R1, R2, and R3, respectively. The (MHBP) supplementation at 50 and 100 g / head resulted in better feed efficiency rate for R2 and R3, groups. Meanwhile, the feed efficiency expressed as DM, TDN and DCP were recorded the lower value for R1 group. Such improvement of feed efficiency in tested groups (R2 and R3) may reflect the obtained results of digestibility and nutritive values of these rations. However, this beneficial effect which can be attributed to (MHBP) supplementation.

The feed cost LE/kg milk, was reduced as result to the (MHBP) supplementation, whereas the lowest value for feed cost LE / kg milk was recorded for R3 group. These results were reported by Mohamed *et al.* (2005) who observed that the feeding cost was decreased as a result to using chamomile cake CC.

In conclusion it is apparent that MHBP supplementation could be used successfully and economically by supplementing 50 or 100 g / head of ewes diets according to the availability of this material and production circumstances, which improves digestibility, nutritive value and feed efficiency which are mostly reflected improvement ewes performance.

## REFERENCES

- A.O.A.C., 1999. Association of official Agricultural chemists. Official Methods of Analysis 16<sup>th</sup> ed A.O.A.C, Washington , DC . USA
- Djouvinov D.; D.I.; Povlov; A. Ichev and E. Emev, 1997. Menthor Piperits Huds and Ocimum Bnsilicum L- ethericol by – products as roughages for sheep feeding. Animal feed science and Technology , 68: 3-4, 287 – 294.
- Duncan, D.B., 1955. Multiple Range and Multiple F -test. Biometrics, 11:1-42.
- El-Ayek M.Y., 1999 . Influence of substituting concentrate feed mixture by *Nigella sativa* meal on: 1-Voluntary intake, digestibility , some rumen parameters and microbial protein yield with sheep. Egyptian J, Nutrition and Feeds 2: 279.
- Gabr, A.A.; S.A. El-Aouty; A.A. Zaki; F.F.Abou Ammo and E.S.I. El -Gohary, 1998. Productive performance of lambs fed diets containing *Nigella Sativa* meal . Egyptian J. Nutrition and Feeds. 1 2: 97.
- Merikli, A. H. 1990. The Lipophilic compounds of *Matricaria chamomilla* with no chamazulene in the volatile oil. International J. of Rulde Drug Res. 28. 2:145.
- Mohamed, A.H.; Nadia, M.Abd El-Bar and K. Ibrahim 2005. Incorporation of aromatic plants by-products in ruminants diets 2- effect on digestibility, rumen fermentation and ewes performance. Egyptian J. of Nutrition and Feeds, Vol. 8 1 Special issue, 445 -460.
- Mohamed, A.H. and K. Ibrahim, 2003. Incorporation of aromatic plants by-products in ruminants diets 1- effect of using aromatic plants by-products on digestibility, rumen fermentation and growing lambs performance. Egyptian J. of Nutrition and Feeds, Vol. 6 Special issue, 1209-1217
- NRC, 1989. Nutrient Requirements of sheep. 2<sup>nd</sup> Ed. Nat . Acad. Sci., Washington, DC.
- Pesce, A.J. and L.A. Kaplan, 1977. Methods in clinical chemistry" The C.V. Mosby Co., St.Louis , Washington , D.C. Toronto .

- Salem, F. A. and M. R. El-Mahdy, 2001. Effect of some medicinal plants as feed additives on nutrients digestibility, rumen fermentation, blood and carcass characteristics of sheep. 2<sup>nd</sup> Conf. of Animal Prod. & health in Semi Arid Areas., 4-6 September, El-Arish, North Sinai, Egypt.
- Siest, G., J. Henny and F. Schiele 1981. Interpretation des examens de laboratorie Karger ed. 206.
- Snedecor G.w. and W.G . Cochran, 1967. Statistical Methods 7<sup>th</sup> Ed., Iowa State University Press, Ames, Iowa, U.S.A.
- Tiwari, D.P. ; C.M. Tiwari; R.K Jain; C.P. Mishra and U.K. Mishra, 1996. Nutritive evaluation of Vantulse *Oscimum bascilinum* *Ocimum basilicum* cake in Sahiwal cows Indian J.of Animal Nutrition . 13 : 3, 178- 180.
- Wideneki, K.; R. Stenzel; L. Saba and H. Bis-Wencel,1998. Preliminary results of learing calves fed with mineral –herb mash for 3 months. Annales Universitatis – Mariae Curie Saklodowska Sectio, EE. Zootechnica 16: 107- 112
- Wojcik, S.; S. Blaziak; K.Widensk and K. Zawislak, 1984. Feeding value of some herbal by-products . Biuletyn –informacyjny Przemyshe Paszowego. 233 29-36.

## تأثير اضافة كسب البردقوش على الاداء الانتاجى للنعاج ونتاجها.

خميس إبراهيم محمد، علاء الدين حسن محمد، صفاء نادى عبدالعظيم

معهد بحوث الإنتاج الحيوانى، مركز البحوث الزراعية، مصر

تهدف هذه الدراسة الى دراسة تأثير اضافة مخلفات نبات البردقوش ( م ن ب) الناتجة من استخلاص الزيت العطرى، على الأداء الانتاجى للنعاج. استخدمت في هذه الدراسة ١٥ نعجة متوسط وزنها 45.9 وعمرها ٣-٤ سنوات في موسم الحليب الثانى أوالثالث قسمت الى ٣ مجموعات متماثلة وبدأت التغذية على العلائق المختبرة خلال الشهرين الأخيرين من الحمل واستمرت لمدة ٣ شهور. وقد تم دراسة تأثير اضافة ( م ن ب) على كل من انتاج للنعاج من اللبن و معدلات نمو نتاجها من الميلاد حتى الفطام. وغذيت النعاج عشوائياً على إحدى العلائق التالية : عليقة المقارنة (م١) مكونة من مخلوط علف مركز (٢% من وزن الجسم) مع تبين فول للشبع بينما غذيت المجاميع الاخرى على عليقة المقارنة مضاف لها ( م ن ب) بمعدل ٥٠ أو ١٠٠ جم / للرأس / اليوم لكل من م٢ ، م٣ على التوالى . كذلك تم تنفيذ ٣ تجارب هضم لتقييم معاملات الهضم والقيمة الغذائية للعلائق المختبرة.

أظهرت النتائج تحسناً معنوياً ( إحتمال ٠,٠٥) فى معاملات الهضم للمادة العضوية والبروتين الخام والالياف الخام ومستخلص خال الأزوت والقيمة الغذائية محسوبة كمركبات غذائية مهضومة ومعادل النشا وبروتين خام مهضوم للمجموعتين م٢، م٣ المختبرتين مقارنة بعليقة المقارنة م١ . وأظهرت العليقة م٣ أعلى قيم لكل من معاملات الهضم والقيمة الغذائية . وقد دلت النتائج على ان المعاملتين م٢، م٣ أدت إلى زيادة متوسط إدرار اللبن مقارنة بمجموعة المقارنة، بالاضافة الى ذلك فإن متوسط الزيادة فى الوزن بالنسبة للحملان من الميلاد حتى الفطام حققت زيادة معنوية للمجموعة م٣ مقارنة بمجموعة المقارنة بينما لم توجد فروق معنوية بالنسبة للمجموعة م٢ . كذلك حقق الوزن عند الفطام للمجموعة م٣ زيادة معنوية مقارنة بمجموعة المقارنة وذلك كنتيجة لزيادة معدل إنتاج اللبن .