

EFFECT OF USING TWO MEDICINAL HERBS AND PLANTS MIXTURES AS FEED ADDITIVES ON THE PERFORMANCE OF GROWING LAMBS

El- Saadany, S. A.¹; M. Abd El – Momin ² and F.F. Abou- Ammou ²

- 1- Animal Nutrition Research Department
- 2- Sheep and Goat Research Department, Animal Production Research Institute, Agricultural Research Center, Dokki, Giza, Egypt

ABSTRACT

Twenty four crossbred lambs (0.75 Rahmani X 0.25 Romanov) averaged four months old and 13.50 kg. live body weight were divided into four similar groups, six lambs/ group to compare the effect of two feed additives (FA) based on medicinal herbs and plants on growth performance. Lambs were fed according to allowances of N.R.C. of sheep (1985) for seven months on a control ration (CR) free from FA, consisted of 25.36% concentrate feed mixture + 20.90% wheat straw + 53.74% berseem, on DM basis. Tested rations were composed per lamb/ day of : CR + 5 g. Biotonic (Biot.) for tested ration 1 (TR1), CR + 5 g. Digeston (Dig.) for TR2 and CR + 5 g.: Biot. + Dig. mixture (1:1) for TR3. Results showed that TR1 significantly ($P<0.05$) improved all digestibility coefficients (DC) except EE and increased nutritive values (NV) as SV, TDN and DCP than those of CR that had the lowest values among treatments. Biotonic group significantly ($P<0.05$) raised DC of DM, OM, EE, CF than those of Dig. group, while insignificantly improved DC of all nutrients and NV than those of TR3. Average final body weight (FBW) of TR1 lambs significantly ($P<0.05$) increased than those of the CR and TR2. Average daily weight gain (ADG) of TR1 was significantly ($P<0.05$) higher by 21.85 and 11.92% than those of CR and TR2, respectively. Biotonic group had insignificantly higher FBW and ADG values than those of TR3. Lambs consumed all tested rations exhibiting that FA didn't have any undesirable taste. Biotonic group showed the best feed conversion (FC) as kg. TDN, SV and DCP/ kg. BWG, while CR fulfilled the lowest FC/ kg. BWG followed by Dig. group. Biotonic group increased the economic return (ER)/head by 21.71 and 20.23 % than CR and TR2, respectively, while CR showed the lowest ER /h among treatments. This study recommends using Biotonic as feed additive to elevate average daily weight gain and the economic return.

Keywords: sheep - medicinal herbs and plants – growth promoters - digestibility– economic efficiency.

INTRODUCTION

It was ended recently, that using chemicals as feed additives, specially in the synthesized form may cause serious hazards to plants, animals and humans. Meanwhile medicinal herbs and plants (MH&P) proved to be safe since ancient eras of the early history which encouraged the worldwide trend to minimize the use of chemicals and return to the nature. Studying the effect of extracted effective constituents of a medicinal plant cannot explain exactly how it works as a whole, in other words the value of a medicinal plant cannot be reduced simply to a list of its active constituents (Chevallier, 1996). Inspecting the literature explored that using MH&P in animal nutrition as stimulants for meat production is a very recent approach. It is important to

state that medical effects of MH&P in this work are derived from references on human due to lack of references on animals. Schauenberg and Paris (1977) mentioned that *Foeniculum vulgare* and *Pimpinella anisum* have anti-stomachache, aromatic, and appetizing effects. Edinger (1982) stated that *Carum carvi* stimulates the functions of the digestive system, relaxes spasms of smooth muscles and acts as antispasmodic and tonic. Boulos (1983) indicated that some MH&P are used as tonics and restoratives such as *Trigonella foenum graecum*, *Sessamum indicum* and *Lepidium sativum*. Other plants were found to have an antihelminthic and vermifuge action as *Punica granatum* and *Peganum harmala*. Moreover Hanafy and Hatem (1991) found that *Nigella sativa* seeds extract inhibited Gram-positive and Gram-negative bacteria. Ferdous *et al.* (1992) indicated that the oil of *Nigella sativa* seeds has therapeutic potential for the treatment of diarrhea caused by 37 isolates of *Shigella species* and 10 strains of *V. cholerae* and *E. coli*. Locally, supplementing a mixture of medicinal herbs and plants (Milkplus®) to rations of lactating rabbit does by Soliman *et al.* (1995), lactating ewes by El-Saadany *et al.* (1996) and buffalo cows by El-Saadany *et al.* (1999) improved live body weight of litters and lambs and increased milk production of ewes and buffalo cows than those fed the same rations without Milkplus®. This work aimed to compare the effect of supplementing two commercial mixtures, based on natural medicinal herbs and plants, Biotonic® (Biot.) and Digeston® (Dig.) either separated or mixed on lambs growth performance.

MATERIALS AND METHODS

Twenty four crossbred lambs (0.75 Rahmani X 0.25 Romanov) were chosen randomly from the herd of Mehallet Moussa Expt. Stn., Anim. Prod. Res. Inst. (A.P.R.I.), at Kafr El-Sheikh province to conduct this experiment at the same station. Lambs averaged four months old and 13.50 kg live body weight were divided into four similar groups, six lambs/ group. Lambs were kept under similar housing conditions, in four semi-open sheds. Rations were offered in group feeding to lambs of each group, twice daily at 8 am. and 4 p.m. Drinking water and mineral blocks were available for free choice. Each Kg of mineral blocks composed of: 185.0 g. calcium di-phosphate, 54.0 g. potassium sulfate, 50.2 g. ferric sulfate, 43.5 g. magnesium sulfate, 24.8 g. manganese sulfate, 21.0 g. sulfur, 11.9 g. copper sulfate, 10.0 g. zinc oxide, 527.0 mg. potassium iodide, 287.0 mg. cobalt sulfate, 145.0 mg. sodium selenite, 64000 IU vitamin (Vit.) A, 60000 IU D3, 64.0 IU Vit. E, 8.0 mg. pantothenic acid, 7.0 mg. Vit. B1, 3.0 mg. Vit. B6, 600.0 mg choline chloride, 40.0 mg niacin, 3.0 mg Vit. B2 and 50.0 g. malasses, then sodium chloride up to 1000.0 g. The mineral blocks were purchased from Biochima Company at Cairo to farms of A.P.R.I. Feed additives were mixed manually thoroughly with some grinded amounts of concentrate feed mixture (CFM) and offered to lambs mixed with CFM in equal amounts twice daily. Animals were fed for seven

Herbal feed additives: Biotonic, Digeston and Milkplus were produced by Massoud Group Company, Qalyoub, Cairo- Alexandria agriculture highway

months according to allowances of N.R.C. of sheep (1985). The control group was fed on a ration (CR) consisted of 25.36 % CFM + 20.90 % wheat straw (WS) + 53.74 % Berseem (B), on DM basis. Tested rations were composed per lamb/ day of : CR + 5 g. Biotonic (Biot.) for tested ration 1 (TR1), CR + 5 g. Digeston (Dig.) for TR2 and CR + 5 g.: Biot. + Dig. mixture (1:1) for TR3. Concentrate feed mixture composed of: 37.5% wheat bran, 27% yellow corn, 12.5% soybean meal (44% CP), 10.0% undecorticated cottonseed cake, 5% rice bran, 4% molasses, 3% limestone and 1% sodium chloride. The concentrate feed mixture was manufactured under control specially to farms of A.P.R.I. in Oil and Soap Governmental Companies.

Four digestibility trials were carried during the fifth month of the feeding trial using three lambs from each group to determine the nutritive value of the experimental rations. Lambs were fed individually in metabolic cages for ten days as preliminary period followed by seven days as collection period. Samples of 10% of the daily feces were obtained individually during the collection period, dried, grinded and kept along with samples of experimental feeds in deep freezer for chemical analysis.

Proximate analysis of feeds and feces samples was carried out according to the methods of A.O.A.C.(1980). Statistical analysis was carried out according to Steel and Torrie (1980). Significant differences were determined using Duncan 's multiple-range test (1955). Level of significance used in this study was ($P<0.05$).

RESULTS AND DISCUSSION

Composition of feed additives:

Inspecting data in Table (1) show that Biotonic (Biot.) and Digeston (Dig.) composed of 24 and 8 MH&P, respectively (resp.). Ratio of their components ranged between 0.01-2.0% and 5.0 – 15.0% in total of 17% and 65% for Biot. and Dig., resp. Five MH&P were combined between the two mixtures with a rate of 10-15 times higher in Dig. than Biot. Data in Table (2) show that Dig. had higher EE, CF, ash and NFE than Biot. which had obviously higher CP content than Dig. Details of essential amino acids cleared that Biot. was certainly superior to Dig. in its content of methionine, lysine, tryptophan, arginine, histidine, threonine, phenyl alanine, valine and glutamic acids, while it was lower in cysteine and leucine than Dig. Data in Table (2) show also that Biot. comprised most of the micro elements, as it also involved most unsaturated essential fatty acids which could be an efficient root to pro-vitamin F synthesis, that have been determined as an essential growth factor. Tables (3 & 4) show the effective groups and their medical effects for most MH&P comprised in Biot. and Dig. mixtures.

Table (1) Composition of the experimental feed additives (%).

Ingredients	Biot-onic	Diges-ton	Ingredients	Biot-onic	Diges-ton
<i>Ferula assafoetida</i>	0.01	-	<i>Acacia nilotica</i>	1.9	-
<i>Curcuma longa</i>	0.01	-	<i>Lactuca sativa</i>	1.0	-
<i>Citrullus colocynthes</i>	0.02	-	<i>Coriandrum sativum</i>	1.0	15.0
<i>Prunse virginiana</i>	0.06	-	<i>Nigella sativa</i>	1.0	10.0
<i>Peganum harmala</i>	0.10	-	<i>Cyperus esclentus</i>	1.0	-
<i>Plantago ovata</i>	0.10	-	<i>Lepidium sativum</i>	1.0	-
<i>Punica granatum</i>	0.10	-	<i>Trigonella foenum graecum</i>	2.0	-
<i>Cassia fistula</i>	0.10	-	<i>Cicer aritimum</i>	2.0	-
<i>Zinziber officinalis</i>	0.20	-	<i>Orchis mascula</i>	2.0	-
<i>Sessamum indicum oil</i>	0.50	-	<i>Lupinus termis</i>	-	5.0
<i>Ceratonia siliqua</i>	0.50	-	<i>Cuminum cyminum</i>	-	5.0
<i>Foeniculum vulgare</i>	0.60	5.0	<i>Glossostemon bruguieri</i>	0.2	-
<i>Pimpinella anisum</i>	0.80	10.0	Glutufeed, carrier substance	-	35.0
<i>Carum carvi</i>	0.80	10.0	Dried condensed corn distillers	83.0	-
<i>Thymus vulgaris</i>	-	5.0	Total	100.0	100.0

Table (2): Chemical composition of the tested feed additives (on DM basis %).

Item	Biot-onic	Dig-Eston	Item	Biot-Onic	Dig-eston
Chemical analysis (1)			Volatile oils content % (3)		
Moisture	9.12	8.92	α – Pienene	1.261	0.581
Crude protein	29.21	21.78	Camphene	1.059	0.221
Ether extract	7.10	9.72	Cincol	1.38	4.83
Crude fiber	10.56	12.41	Linalool	1.43	
Ash	6.86	8.00	Citronellol	2.86	0.403
Nitrogen free extract	46.27	48.09	Ethyl – cinamate	1.20	
Total	100.00	100.00	Menthol	14.81	8.606
Mineral content (2)			Carvon		
Calcium, %	0.586		Carvacol	8.92	
Phosphorus, %	0.575		Eugenol	13.07	
Chlorine, %	0.464		Piperitone	19.047	
Iron, ppm	210		Geranyl acetate	1.40	0.387
Copper, ppm	55		Essential amino acids content % (3)		
Zinc, ppm	93.9		Cysteine	10.99	14.31
Manganese, ppm	33.1		Methionine	0.54	0.36
Selenium, ppm	055		Lysine	1.92	1.66
Cobalt, ppm	0.11		Tryptophan	0.210	
Essential, unsaturated fatty acids content % (3)			Arginine	1.10	
Oleic, C18:1	1.07	0.90	Histidine	0.66	
Linoleic, C18:2	0.372	0.763	Threonine	1.07	
Linoleinic, C18:3	4.436	1.015	Phenyl alanine	8.84	6.31
Arachidonic, C20	1.039	1.142	Valine	20.09	2.1
			Glutamic	28.51	20.00
			Leucine	4.63	13.30

(1) Analyzed by The Central Laboratory for Foods and Feeds. Giza

(2) Analyzed by The Central Laboratory of Fac. of Agric. Ain Shams Univ., Shubra El-Khima, Cairo.

(3) Analyzed by Gas Liquid Chromatography at The Special Unit of The National Research Center, Dokki. Giza.

(4) Blank cells didn't estimated.

Table (3): Effective groups of some medicinal herbs and plants included in Biotonic and their medical effects

Scientific name	Effective groups	Medical effect	Reference
<i>Ferula assafoetida</i>	Resins, volatile oil, gum, coumarins, foetidin.	Expectorant, digestive, anti-bloating, whooping cough, lowers blood pressure, expels worms, encourage weight gain, carminative, laxative.	Shams El-Din, 1990.
<i>Curcuma longa</i>	Volatile oils, zingiberen, turmerone, curcumin, bitter principles, resins	Stimulates bile secretion, anti-inflammatory, antioxidant, anti-bacterial, anti-stomachache, and anti-dysentery, stomachic, tonic.	El-Baba, 1971; Shams El-Din, 1990. and Chevallier, 1996.
<i>Citrullus colocynthes</i>	Resins, alkaloids, pectin, saponine, colcynthin, citrullol, glucosides, elaterin, fixed oils, anti-ticks.	Purgative, antiseptic, laxative, anti-rheumatic, liver stimulant, antibacterial, antifungal.	Shams El-Din, 1990.
<i>Prunse virginiana</i>		Digestive, carminative, diuretic, stimulant for nervous system, expectorant, tonic, expels worms, encourage weight gain.	Shams El-Din, 1990.
<i>Peganum harmala</i>	Alkaloids, harmaline, harmine, harmalol, peganine.	Protozoacidal, killer to tepea, C.N.S. stimulant, treatment of malaria, purported aphrodisiac, euphoric, anti-helminthic, anti-diabetic.	El-Baba, 1971 and Chevallier, 1996.
<i>Plantago ovata</i>	Gums, inthracenone	Laxative	Shams El-Din, 1990.
<i>Punica granatum</i>	Tannins, pteriens, vitamins A, B, cetric acid, bitter materials, minerals.	Anti-diarrhea, and dysentery, expels taenia –worms, digestive, antiseptic.	El-Baba, 1971 and Chevallier, 1996.
<i>Cassia fistula</i>			
<i>Zinziber officinalis</i>	Zingiberne (20-30%), oleoresin, gingerol, shogaols, volatile oils, resins.	Carminative, circulatory stimulant, antiseptic, anti-inflammatory, inhibits coughing, . tonic, vasodeliator.	El-Baba, 1971; Shams El-Din, 1990. and Chevallier, 1996.
<i>Sessamum indicum</i>	Fixed oils (50%) contains glycerides of oliec, linoleic, and arachidic acids, lecithin, cholin, globulin.	Nutritive tonic, pro-vitamins, restorative, laxative.	Trease and Evans, 1983 and Shams El-Din, 1990.
<i>Ceratonia siliqua</i>	Sugars, fats, proteins, vitamins, tannins, starch	Anti-diarrhea, expels worms, anti-stomachache	El-Baba, 1971 and Chevallier, 1996.
<i>Foeniculum vulgare</i> : See Table (4)			
<i>Pimpinella anisum</i> : See Table (4)			
<i>Carum carvi</i> : See Table (4)			

Table (3) , Continued

<i>Acacia Nilotica</i>	Gums,	Anti-diarrhea, anti-amoebic, antispasmodic, hypotensive.	Said, 1969
<i>Lactuca Sativa</i>	Volatile oils, fixed oils, minerals, vitamins (A, B, C, E), lactocarium, thridace.	Expels worms, calmative, sedative, galactagouge, laxative, tonic for eye sight, anti-diabetic.	Shams El-Din, 1990.
Scientific name	Effective groups	Medical effect	Reference
<i>Coriandrum sativum</i>	Volatile oil, coriander oil, linaloole, pinene, geraniole, terpinine, flavonoids, terpens,	Carminative, relieve colic, appetizer, sedative, stomachic, digestive, anti-bloating, cramps, counters nervous tension.	Shams El-Din, 1990.
<i>Nigella sativa</i> : See Table (4)			
<i>Cyperus esclentus</i>	Fixed oil, shufa oil.	Digestive, tonic, alleviates flatulence, diuretic, anti- colic, debility, diarrhea, sedative, carminative, appetizer, galactagouge, disinfectant against kidney , liver, chest inflammations, anti-stomachache .	El-Baba, 1971; Al-Yahya, 1986 and Chevallier, 1996.
<i>Lepidium sativum</i>	Polysaccharides, galacturonic acid, mucilage, cardiac glucosides, flavonoids, triterpins, sterols, alkaloids, tannins.	Tonic, restorative, appetizer, carminative, galactagouge, expectorant, anti diarrhea, anti-dysentery, anti-stomachache, digestive , anti-scorbutic, pulmonary stimulant.	El-Baba, 1971; Al-Yahya, 1986; Rizk &El-Nowaihi, 1989 and Chevallier, 1996.
<i>Trigonella foenum graecum</i>	Trigonelline, saponins (diosgenin, gitogenin, tigogenin), mucilage, volatile oil, alkaloids, flavonoids, diosgenin, fixed oils, vitamins, A, B6, C and minerals, Ca, P.	Anti-diabetics, useful for treating : asthma, Throat inflammations, stomach ulcer. Galactagouge, encourage weight gain, lower fever, lower blood cholesterol level, treats cervical cancer, tonic, restorative, anti-fungal.	Edinger, 1982; Boulos, 1983; Abou-Zeid, 1986; Chevallier, 1996 and Zeid, 1998
<i>Dicer aritimum</i>	Vitamins, Minerals.	Tonic for nerves and brain, diuretic, dissolve kidney stones, anti-diarrhea.	Shams El-Din, 1990.
<i>Orchis mascula</i>	Mucilage, dextrans, pentosans, volatile oils, minerals.	Tonic, anti-diarrhea, and dysentery, expels tape-worms.	El-Baba,1971; Shams El-Din, 1990 and Chevallier, 1996.
<i>Glossostem-on bruguieri</i>	Mucilage, starch, pectin, tannins, fats, minerals.	Tonic	Shams El-Din, 1990.
<i>Foeniculum vulgare</i> : See Table (4)			
E			

Table (4): Effective groups of medicinal herbs and plants included in Digeston and their medical effects

Scientific name	Effective groups	Medical effects	Reference
<i>Pimpinella anisum</i>	Anethole, methyl chavicol, estrogen, sterols, flavonoids.	Anti-stomachache, digestive, aromatic, appetizer, tonic, appetizer, carminative, anti-cough, expectorant, galactagouge, relieve toothache, anti-colic.	Schauenberg & Paris, 1977; Al-Yahya, 1986 and Chevallier, 1996.
<i>Carum carvi</i>	Caraway volatile oil, Carvone, fixed oils, flavonoids, polysaccharides. Lemonene, cardiac glucosides.	Antiseptic, tonic, carminative, soothe digestive tract, relieve colic and cramps of bloat, menstrual, appetizer, diuretic, cough remedy, anti-spasmodic, tonic, galactagouge, relaxes spasms of smooth muscles, digestive.	El-Baba, 1971; Al-Yahya, 1986 and Chevallier, 1996.
<i>Thymus vulgaris</i>	Volatile oils, thymol, methyl-chavicol, cincole, borneole, flavonoids, tannins, carvacrol, resins, gums.	Antiseptic, anti-fungal, anti-chest infections, asthma, hay fever, expectorant, expels worms, expectorant, tonic, digestive.	El-Baba, 1971 and Chevallier, 1996.
<i>Coriandrum sativum</i>	Volatile oil, coriander oil, linaloole, pinene, geraniole.	Carminative, relieve colic, appetizer, sedative, stomachic, digestive, terpens.	El-Baba, 1971 and Chevallier, 1996.
<i>Nigella sativa</i>	Niugellone, fixed oils, volatile oil, saponins.	Carminative, diuretic, anti-bacterial, anti-inflammation, CNS-depressant, analgesic-activities, broncho-dilator, hypotensive, Immuno-stimulant, hypoglycaemic activity, galactagouge.	El-Baba, 1971; Hanafy & Hatem, 1991; Ferdous et. al.; 1992 and Chevallier, 1996.
<i>Lupinus termis</i>	Alkaloids, bitter materials, spartin, vitamin B complex, minerals, labanin: Ca, P.	Tonic for C.N.S, heart and circulatory system, liver, bile secretion and spleen, digestive, anti-hypertension.	El-Baba, 1971; Salem, 1987 and Shams El-Din, 1990.
<i>Foeniculum vulgare</i> <i>E</i>	Volatile oil, anethole, fenchone, methyl chavicol, flavonoids, coumarins, sterols. Pinene, camphene, phellandrene.	Antispasmodic, relieve bloat, appetizer, diuretic, anti-inflammatory, digestive, treat kidney stones, urinary anti-septic, galactagouge, tonic, aromatic, sedative, carminative, anti-stomachache.	Schauenberg and Paris, 1977; Al-Yahya, 1986 and Chevallier, 1996
<i>Cuminum cyminum</i>	Volatile oil, aldehydes, pinene, alpha – terpineol, flavonoids, apigenin.	Sedative for pain of digestive tract, chest and cough, treat rotten teeth, carminative, stomachic, diuretic, digestive.	Boulos, 1983 and Trease and Evans 1983 .

Feed evaluation- Digestibility trials:

Data in Table (5) show that chemical composition of the experimental feeds was similar to average chemical compositions as those of A.P.R.I.(1997). Results in Table (6) show that TR1 significantly ($P<0.05$) improved all nutrients digestibility coefficients (DC) irrespective of EE and nutritive value (NV) as SV, TDN and DCP than those of the CR which mostly

had the lowest values among treatments. Biotonic group increased significantly ($P<0.05$) DC of DM, OM, EE, and CF, while NV forms were insignificantly higher than those of the TR2. Biotonic group showed insignificantly higher DC of all nutrients and NV forms than those of TR3. Results herein agree with Wallace and Newbold (1992) who mentioned that feed additives might improve ruminal fermentation by increasing bacterial activity, which in turn increases degradability of lignocellulosic tissues and flow of microbial protein from the rumen to next parts. Results obtained agree also with El-Baba (1971) and Chevallier (1996) who mentioned that *Lepidium sativum*, *Curcuma longa*, *Peganum harmala*, *Punica granatum*, *Zinziber officinalis*, *Ceratonia siliqua*, *Thymus vulgaris*, *Nigella sativa* and *Orchis mascula* act as anti-diarrhea, anti-dysentery, anti-bacterial, protozoacidal, expellant to tepea and worms and antiseptic which decreases losses of digested feed due to parasites and save digested nutrients to improved production. Data obtained were in harmony with El-Shayeb and Mabrouk (1984) who found that Fenugreek extract inhibited *Aspergillus flavous* growth and aflatoxin production.

Table (5): Chemical composition of feeds and the control ration (on DM basis %).

Item	%	DM	OM	CP	EE	CF	Ash	NFE
C F M.	25.36	89.49	90.23	18.42	3.94	12.61	9.77	55.26
Wheat straw	20.90	92.72	90.24	2.52	1.28	41.47	9.76	44.97
Berseem	53.74	19.47	87.06	14.23	1.34	31.38	12.94	40.11
Control ration	100.0	30.59	88.53	12.84	1.98	28.73	11.47	44.98

Table (6): Digestibility coefficients and nutritive values of experimental rations.

Item	(CR) Control ration	(TR1) 5 g Biot.	(TR2) 5 g Dig.	(TR3) Biot.+ Dig.
Digestion coefficients				
DM	57.26 ^b	64.13 ^a	58.73 ^b	60.86 ^{ab}
OM	64.42 ^b	70.50 ^a	64.30 ^b	67.40 ^a
CP	60.86 ^b	70.92 ^a	65.29 ^{ab}	68.58 ^{ab}
EE	77.83 ^a	75.94 ^a	69.93 ^b	71.10 ^{ab}
CF	52.61 ^b	63.27 ^a	53.94 ^b	59.57 ^{ab}
Ash	28.65 ^b	38.67 ^a	36.48 ^a	34.69 ^{ab}
NFE	66.36 ^b	71.85 ^a	68.02 ^{ab}	70.36 ^a
Nutritive values				
SV	46.81 ^b	51.70 ^a	47.92 ^{ab}	50.10 ^a
TDN	56.25 ^b	62.99 ^a	57.59 ^{ab}	60.74 ^a
DCP	7.82 ^b	9.11 ^a	8.39 ^{ab}	8.81 ^a

Means with the same letter on the same row are not significantly ($p<0.05$) different.

Body weight gain:

Results in Table (7) cleared that lambs fed Biotonic significantly ($P<0.05$) increased average total body weight gain (BWG)/lamb compared with those of the CR and Dig. groups. Difference of average daily weight gain (ADG) were significantly ($P<0.05$) higher by 21.85 and 11.92 % for TR1 than those of CR and TR2, respectively. Biotonic group had insignificantly higher

ADG values than TR3, which showed along with TR2 intermediate values among TR1 and CR.

Boulos (1983) and Al-Yahya (1986) stated that *Sessamum indicum oil* has high contents of glycerides of oleic, linoleic, and arachidic acids, lecithin, cholin which explain the high content of Biotonic in the unsaturated fatty acids: oleic, linoleic, and arachidic acids that act as pro-vitamin F and have been determined as an essential factor for growth as mentioned by Klatt (1986) and interprets why TR1 exerted the highest ADG among groups. Results obtained confirmed those of Abou-Ammou and El-Hosseiny (1999) and Khinizy (1999) who found that Biotonic supplement showed higher daily weight gain with lambs than the control ration free from feed additives and other group supplemented with Bosporo ®. Findings of this study are in compatibility with Abou-Zeid (1986), Chevallier (1996) and Zeid (1998) who found that *Trigonella Foenum graecum*, which is included in the tested additives, encourages body weight gain.

Table (7): Average daily body weight gain in response to feed additives.

Treatment Item	CR	TR1 Biotonic	TR2 Digeston	TR3 Biot.+Dig
Average initial body weight, kg/lamb	13.46	13.50	13.46	13.50
Average final body weight, kg/lamb	45.90 ^b	53.03 ^a	48.78 ^b	50.22 ^{ab}
Total body weight gain, kg/lamb	32.44 ^b	39.53 ^a	35.32 ^b	36.72 ^{ab}
Average daily weight gain, g. / d	154.48 ^b	188.24 ^a	168.19 ^b	174.86 ^{ab}
Difference of average daily weight gain %	100.0	121.85	108.87	113.19

Means with the same letter on the same row are not significantly ($p < 0.05$) different.

Matching results of digestibility and total body weight gain (TBG) with the composition of feed additives and the effective groups of MH&P might indicate that the positive associative effect obtained by Biot. versus Dig. might refer to the effective groups comprised in the nineteen MH&P included only in Biot. It could be suggested that the nineteen MH&P included in Biot. could stimulate efficiently rumen functions through one or more of the following actions: 1) inhibiting activity of some antagonistic organisms that increases the activity of beneficial bacteria increasing degradability of lignocellulosic tissues, 2) saving some micro-elements, ionophores, pro vitamins, vitamins, hormones and/ or enzymes required to efficient digestion, absorption and metabolism, 3) decreasing hazards of some harmful heavy metals as lead by chelation with them, 4) minimizing effectively hazards of mycotoxins by inhibition of fungi growth and mycotoxin production. Moreover they act as anti-diarrhea, anti-dysentery, anti-bacterial, protozoacidal, expellant to tepea and worms and antiseptic which decreases losses of digested feed due to parasites which reflect on higher digestibility and TBG with Biot. versus Dig. and CR.

Feed intake and conversion and economic return:

Feeding cost was estimated according to the prevailing prices of feeds during the time of the experiment which were 590.0, 120.0 and 50.0 L.E./ ton respectively for CFM, WS and green B. Cost of feed additives was

20.0 L.E./1 Kg. of each of Biot. and Dig.. Average cost of daily feeding/ lamb/ day for CR was 0.453 L.E, while it was 0.553. L.E for any of the tested rations. Price of live body weight gain was 8.00 L.E./ kg. Data in Table (8) cleared that lambs of CR and tested rations consumed all feeds which were offered to animals according to allowances of N.R.C. of sheep (1985) which gives an impression that feed additives didn't have any undesirable taste which agrees with El-Baba (1971), Boulos (1983), Al-Yahya (1986) and Chevallier (1996) who mentioned that *Carum Carvi*, *Coriandrum sativum*, *Cyperus Esculents*, *Foeniculum vulgare* and *Pimpinella Anisum* , are appetizers and stomachics.

Table (8): Feed intake and economic return of the experimental rations.

Treatment Item	CR	Biot- onic	Dig- eston	Biot. +Dig.
Feed intake, kg. DM /h/d:				
Concentrate feed mixture	0.345	0.345	0.345	0.345
Wheat straw	0.285	0.285	0.285	0.285
Berseem	0.732	0.732	0.732	0.732
Biotonic	--	0.005	--	0.0025
Digston	--	--	0.005	0.0025
Total DM intake	1.362	1.367	1.367	1.367
Nutrients intake, kg. DM / h/d as:				
TDN	0.766	0.858	0.785	0.827
SV	0.638	0.704	0.653	0.682
DCP	0.106	0.124	0.114	0.120
Daily body weight gain, g.	154.48	188.24	168.19	174.86
Feed conversion / as kg. / kg. BWG :				
DM	8.817	7.262	8.128	7.818
TDN	4.959	4.558	4.667	4.729
SV	4.130	3.740	3.883	3.900
DCP	0.686	0.669	0.678	0.686
Feed cost as L.E. / lamb/ day:	0.453	0.553	0.553	0.553
Feed cost as L.E. / kg. BWG:	2.932	2.938	3.288	3.163
Feed cost / kg. BWG %	100.00	100.20	112.14	107.88
Total feed cost L.E./ lamb:	95.114	116.139	116.132	116.145
Price of total BWG/ lamb, L.E.	259.52	316.240	282.56	293.76
Economic return */lamb	164.406	200.101	166.428	177.615
Economic return /lamb %	100.00	121.71	101.23	108.03

□ Economic return = Price of total BWG/ lamb - Total feed cost L.E./ lamb

Results obtained in Table (8) revealed that TR1 showed the best feed conversion (FC) as kg. TDN, SV and DCP/ kg. BWG, while CR was the poorest FC as kg. DM, TDN and SV / kg. BWG. Digeston group (TR2) and TR3 showed similar FC, both exhibited medium values between TR1 and CR. These findings are in harmony with Abou-Ammou and El-Hosseiny (1999) and Khinizy (1999) who found that FC of lambs fed Biotoinc was significantly (P<0.05) higher than that of CR. Results obtained are of similar trend as those

of Schmidely and Hadjipanayioton (1991) who reported that ionophores improved feed conversion of growing kids. Results are also in harmony with those of Said (1969), Schauenberg and Paris, (1977) and Wallace and Newbold (1992) who mentioned that *Prunse viginiana* , *Coriandrum sativum*, *Foeniculum vulgare*, *Thymus vulgaris* and *Sessamum indicum* oil which were included in the tested feed additives are digestive, act as pro-vitamin F and stimulant for bile juice secretion resulted in improving feed conversion. Findings shown in Table (8) clarify that Biotonic group showed slightly higher feed cost as L.E./kg. BWG than CR, while TR2 exhibited the highest feed cost as L.E./kg. BWG among treatments. On the other hand the price of total BWG/ lamb, L.E. elucidated that Biotonic group showed the highest value, followed by TR3, while CR resulted the lowest price of total BWG/ lamb. Results obtained in Table (8) clear that TR1 had the highest economic return (ER) /lamb, while CR and TR2 (Digeston) showed similar values of ER, being the poorest ER/lamb among treatments. Economic return/lamb was 121.71, 101.23 and 108.03% for TR1, TR2 and TR3, respectively compared with 100% for CR.

CONCLUSION

From the previous results, it could be recommended that using 5 g. Biotonic/ lamb/ day as natural feed additive could improve the nutritive value of rations, body weight, daily body weight gain, feed conversion and increase the economic return/lamb by 21.71% compared with the CR. Moreover Biotonic didn't have any undesirable taste could decrease feed intake, but using Digeston alone is not recommended. Further studies are needed to investigate the effect of using different levels of Biotonic and Digeston on sheep performance.

ACKNOWLEDGEMENT

Research team would like to express their deep gratitude to Massoud Group Company, the producer of Biotonic and Digeston for supplying the experimental additives free of charge for research purpose.

REFERENCES

- Abou-Ammou, F.F. and H.M. El-Hosseiny (1999) Performance and carcass characteristics of lambs fed Biotonic and Bosporo as feed additives in summer and winter seasons. Proc. of The 7th. Conf. on Anim. Nutr., (19-21 Oct.), The Egyptian Soc. of Nutr. and Feeds and Fac. of Environ. Agric. Sci., Univ. of Suez Canal, El-Arish, Egypt.
- Abou-Zeid, E. M. (1986) Medical plants and herbs. (Textbook, in Arabic) Seas house, Beirut.
- Al-Yahya, M.A. (1986) Phytochemical studies on the plants used in traditional medicine of Saudia Arabia. *Phytotherapia*. 7 (3) 179.
- A.O.A.C. Association of Official Agriculture Chemists (1980) Official Methods of Analysis. 10th. Ed. Washington, D.C.

- Animal Production Research Institute (1997) 1st. Ed. (Arabic text book) Scientific and Practical Animal Nutrition, Agricultural Research Center, Ministry of Agriculture and Land Reclamation, Dokki, Giza, Egypt.
- Boulos, L. (1983) Medicinal Plants of North Africa. The American Univ. Cairo Press.
- Chevallier, A. (1996) The Encyclopedia of Medicinal Plants. DK Publishing, INC. New York 10016, U.S.A.
- Duncan D.B. (1955): Multiple range and multiple F-test. Biometrics, 11: 1 - 42.
- Edinger, P. (1982): Herbs. Sunset Books. David E. Clark, California.
- El-Baba, M.Z. (1971) Pharmacognosy Science. Damascus Univ. Press. Vol. II :p : 181
- El-Saadany, S.A.; M. Abd El-Momin; F.F. Abou-Ammou and E. Shehata (1996). Effect of using Medicinal herbs as feed supplements on ruminants performance. 1-Effect of using medicinal herbs as milk stimulants feed supplement on ewes and lambs performance. Egyptian J. of Appl. Sci. 11 (5) 41.
- El-Saadany, S.A.; M.M. Mohey El-Din; I.A. Abou-Selim; S.M. Mahmoud and N.M. El-Kholy (1999) Effect of some medicinal herbs as feed additives on buffalo milk. Proc. of The 7th Sci. Conf. on Anim. Nutr. (19-21 Oct.) The Egyptian Soc. of Nutr. and Feeds and Fac. of Environ. Agric. Sci., Univ. of Suez Canal, El-Arish, Egypt.
- El-Shayeb, N.M.A. and S.S. Mabrouk (1984) Utilization of some edible and medicinal plants to inhibit aflatoxin formation. Nutr. Reports International, 29 (2) 273.
- Ferdous, A.J.; S.N. Islam; M. Ahsan; C.M. Hasan and Z.U. Ahmed (1992). *In vitro* antibacterial activity of the volatile oil of *Nigella sativa* seeds against multiple drug-resistant isolates of *Shigella Spp.* and isolates of *Vibrio cholera* and *Escherichia coli*, Phytotherapy Res. 6, 3: 137.
- Hanafy, M.S.M. and M.E. Hatem (1991). Studies on anti microbial activity of *Nigella sativa* seed (black cumin). J. of Ethno-pharmacology, 34, 2: 275.
- Khinizy, A.E.M (1999) Effect of using some growth promoters on rations digestibility and lambs performance. Egyptian J. Appl. Sci., 14 (2) :318.
- Klatt, L. (1986) The role of Omega-3 polyunsaturated fatty acids. Food Sci., News, L., 16: 1-4.
- National Research Council (1985). 6th. Ed., Nutrient Requirements of Sheep. National Academy Press, Washington, D.C.
- Rizk, A.M. and A.S. El-Nowaihi, (1989) The Phyto-Chemistry of the Horticultural Plants of Qatar. The Sci. and App. Res. Center , University of Qatar.
- Said, H.M., (1969) Hamdard Pharmacopoeia of Eastern Medicine. 1st. Ed. Hamdard Academy, Hamdard National Foudation, The Times Press, Sadar, Karachi, Pakistan.
- Salem, M.; (1987) Herbs but they are medicine, (Arabic Text book) Darel-Marrikh, Al-Riad, Saudia Arabia.
- Schauenberg, P. and F. Paris (1977). Guide to Medical Plants (Textbook). Lutter-Worth Press. Guildford and London.
- Schmidely, P. and M. Hadjipanayioton (1991) Growth promoters for fattening kids. Goat Nutrition, 184, Wageningen, Netherlands.

- Shams El-Din A. (1990) Medication by herbs and plants. 1st. Ed. Scientific book-house, Bierut, Lebanon
- Soliman, A.Z.; N.Y. Abd El-Malak and A.M. Abbas. (1995) Effect of using some commercial feed additives as promoters on the performance of growing and adult rabbits. Egyptian J. Appl. Sci., 10 (6) 501-513.
- Steel, R.G.D. and J.H. Torrie (1980) Principals and Procedures of Statistics. 2nd. Ed McGraw Hill Book Co. New York N.Y.
- Trease, G.E. and W.C. Evans (1983) Pharmacognozy. 12th. Ed. Bailliere Tindall, London.
- Wallace, R.J. and C.G. Newbold (1992) Probiotics for ruminants. In: R Fuller (Ed) Probiotics: The scientific basis.
- Zeid, A.M.M. (1998) Effect of using some medicinal plants on goats performance, Ph. D. Thesis, Fac. of Agric., Cairo Univ. Giza, Egypt.

تأثير استخدام مخلوطين من النباتات والاعشاب الطبية كإضافات أعلاف على أداء الحملان النامية

صالح على السعدنى* - محمود عبد المؤمن** - فاتن فهمى أبو عمرو**
 قسم بحوث تغذية الحيوان* - قسم بحوث تربية الأغنام والماعز**
 معهد بحوث الإنتاج الحيوانى* - مركز البحوث الزراعية - الدقى - الجيزة

قسم أربعة وعشرون حملا خليطا (0.75 رحمانى X 0.25 رومانوف) متوسط عمرها أربعة اشهر ومتوسط وزنها الحى 13.50 كجم إلى أربع مجموعات متشابهة ، ستة حملان بكل مجموعة لمقارنة تأثير إضافة اثنين من إضافات الأعلاف تتكون من النباتات والاعشاب الطبية على النمو . غذيت الحملان طبقا لمعدلات N. R. C. للأغنام لسنة (1985) لمدة سبعة اشهر على عليقة أساسية (ع س) خالية من إضافات الأعلاف تتكون من 25.36% مخلوط علف مركز + 20.90% تبن قمح + 53.74% برسيم ، على أساس المادة الجافة . كانت العلائق المختبرة متماثلة التركيب مع ع س ، وتكونت العليقة المختبرة الأولى (ع م 1) من ع س + 5 جرام بيوتونيك/رأس/ يوم بينما تكونت ع م 2 من ع س + 5 جرام دايجستون /رأس/ يوم وتكونت ع م 3 من 5 جرام : بيوتونيك + دايجستون (1:1) /رأس/ يوم .

أظهرت النتائج المتحصل عليها أن ع م 1 حسنت معنويا (احتمال > 0.05) جميع معاملات الهضم (م . هـ) ماعدا مستخلص الايثير كما حسنت القيمة الغذائية (ق . غ) كمعادل النشا (م . ن) ومجموع المركبات المهضومة (م . م . م) والبروتين الخام المهضوم (ب . خ . م) ، عن ع س التى أظهرت أقل القيم بين المعاملات . زادت مجموعة البيوتونيك قيم م . هـ معنويا (احتمال > 0.05) ل: المادة الجافة والمادة العضوية ، مستخلص الأثير والألياف الخام عن قيم مجموعة الدايجستون وأعلى بصورة غير معنوية لـ م . هـ جميع العناصر الغذائية ، ق . غ عن ع م 3 . وزاد متوسط وزن الجسم النهائى معنويا (احتمال > 0.05) لحملان ع م 1 عن ع س ، ع م 2 . وكان متوسط النمو اليومى أعلى معنويا (احتمال > 0.05) بنسبة 21.85 و 11.92% للعليقة المختبرة الأولى عن ع س و ع م 2 ، بالترتيب . وكانت مجموعة البيوتونيك الأعلى بصورة غير معنوية فى قيم وزن الجسم النهائى ومتوسط النمو اليومى عن ع م 3 . واستهلكت الحملان فى العلائق المختبرة جميع الغذاء المقدم لها مما يعنى عدم وجود أي طعم غير مرغوب فى إضافات الأعلاف . وأظهرت ع م 1 أفضل تحويل غذائى (ت غ) على صورة كجم م . م . م أو م . ن أو ب . خ . م / كجم زيادة فى وزن الجسم (ز و ج) ، بينما حققت ع س اقل معامل تحويل غذائى تلتها مجموعة الدايجستون (ع م 2) . كان العائد الاقتصادى للرأس لمجموعة البيوتونيك اعلى بمعدل 21.71 ، 20.23% عن ع س و عليقة الدايجستون بالترتيب بينما أظهرت ع س أقل عائد اقتصادى بين المعاملات .

وتوصى الدراسة باستخدام البيوتونيك كإضافة غذائية لعلائق النمو فى الاغنام لتحسين معدلات النمو والعائد الاقتصادى .