GROWTH PERFORMANCE AND VISCERAL ORGAN MASS OF AWASSI LAMBS FED DIFFERENT LEVELS OF SOME AGRICULTURAL BY-PRODUCTS SILAGE

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ABSTRACT

This research was conducted to investigate the effect of utilization mixture of some agricultural by - products silage (poultry manure, wheat straw, tomato fruits) on the visceral organ mass of Awassi lambs. A total of 20 Awassi lambs an average body weight of 21.5Kg. were used in this experiment. Lambs were divided into four groups of five lambs each. Lambs in the first group were fed a commercial concentrate feed mixture . Lambs in the second, third and fourth groups were with fed the commercial concentrate feed beside silage with rate of 15, 30 and 45%, respectively. Silage was fed instead of the same amounts of the concentrate feed. Lambs were fed their rations individually for 60 days.

Type of diet had growth performance and variable effects on visceral organs. Lambs fed diet containing 15% silage appeared to heavier ($P<0.05$) trachea and lowest ($P<0.05$) weight of kidney compared to lambs in other groups. Also , they had the lowest ($PO.05$) weights of the omasum wet tissue, omasum and abomasums wet and dry contents. However lambs fed 45% silage diet had the heaviest ($p<0.05$) weights of the above items.

INTRODUCTION:

The aim of animal science research is to improve the efficiency of livestock production, and enabling farmers to produce more economically. Silage is used in wide ranges in livestock operations world wide, especially in feedlot operations. Large amounts of local agricultural by-products are available locally. It varies in amounts, nutritive value and location. Such as fresh poultry manure, cereal hay and tomato fruits. Each of these ingredients is available in huge amounts locally. The tomatoes under focus are the fruits that downgraded and not fit for market. The estimated amount of local poultry manure is one ton /lOOOchickens during a raising period of 50days, and the amount of hay is about 200kg

/ dunum while the amount of downgraded tomato fruit is about 300kg/dunum (Ministry **of Agriculture records, 2000).** It was reported by different researchers that diets have certain influence on gastrointestinal tract and its accessory organs (Johnson ,1985 ; Abo Omar et **al., 1994; Abo Omar, 1995 and Rabayaa, 2000).**

Luminal nutrition plays a major role in maintaining stimulation of both small intestinal mucosal structure and enzyme levels (Johnson, 1985). **Dunaif and Sheeman (1981)** reported that the activities of several enzymes in the rat intestine are changed with response to fiber addition. Different sources of protein, carbohydrates and lipids did not change or influence the growth of small intestine, cecum or colon of rats but some types of fiber did exert an influence (Younoszai **et** al., 1987).

It was reported that various levels of mucosal surface changes included distorted and damaged cells when 15% fiber from four different sources were fed to rats. Alfalfa diet at level of 50% when fed to pigs caused heavier colon, rectum, kidney and total tract weights and tended to increase cecum, small intestine, pancreas and liver weights when compared to pigs fed regular corn-soy diet (Pekas et al., 1983).

No information available about the effect of feeding agricultural by-products silage on visceral organs and gastrointestinal tract (GIT) components.

The objectives of this study were, to investigate the effect of feeding silage of different agricultural by-products on visceral organ mass and GIT components of Awassi lambs.

MATERIALS AND METHODS

Three agricultural by -products (poultry manure, wheat straw, and tomato fruits,) were obtained from local sources used in silage making. Poultry (layers) manure (PM) was sun-dried for 30 days. Wheat straw (WS) was obtained directly after threshing. Tomato fruits (TF) were used as whole down graded fruits. The three materials were mixed together with rates of 500, 250 and 250 g/kg of PM, WS and TF, respectively (Table 1). Sugar was added to the mixture as the following: 30g of plain sugar in 100m water per 1 kg of the ingredient mixture. The mixture was squeezed in big plastic drums and was stored for six months. Twenty-weaned male Awassi lambs with an average body weight of 21.5 Kg. were obtained from a commercial market. Soon after reaching the experimental site, lambs were treated against both internal and external parasites and were vaccinated against enterotoxemia.

Table(l) Chemical composition of silage mixture and components (%)

Item	%	DM	ME, MJ/fcg	Crude protein	Crude fat	Crude fiber	Ash	NFE	Ca	P
PM	50	84	8.3	29.6	2.4	17.2	15.2	35.6	2.6	1.4
WS	25	90	5.5	3.6	1.8	41.5	11.6	41.5	.0.4	.0.3
TF _J	25	6	8.9	16.4	3.9	9.1	8.8	61.8	0.2	.0.5
silage mixture		66	7.75	19.8	2.6	21.3	12.7	43.6	1.5	.0.9

PM =Poultry manure . WS = Wheat straw . TF = Tomato fruits.

Animals were assigned into weight categories and randomly divided into four similar groups of five lambs each. Lambs were allowed to adapt for the new environment and diet for one week. In the first group animals were fed a commercial concentrate feed mixture. In the second, third and fourth groups silage was added with rates of 15, 30and 45% of offered feeds , respectively (Table 1). Silage was added to rations to replace similar amount of concentrate feed mixture.

Animals were fed adlibitum individually and had free access to water and salt blocks. Lambs were weighed on a weekly basis along with feeding trial, which lasted for 60 days.

The daily feed intake was recorded and animals were observed for abnormalities, health problems and comments about all that were recorded. During the feeding trial, three lambs from each group were randomly taken for slaughtering .Lambs..Lambs were slaughtered during the same day by a routine procedure practiced at municipal slaughterhouse and it were were slaughtered in the evening before consuming their evening meals. Animals were bled, skinned and eviscerated. The rectum and esophagus were tied off to prevent loss of gastrointestinal tract (GIT) contents before viscera were removed from the carcass. The liver and gall bladder were removed from the body at the plane immediately adjacent to the base. Lungs, without trachea, were removed and weighed, and the total weight for kidneys and their fat was recorded.

The lower gut and abomasum were tied off at the pylorus, the omasal abomasal junction and the ileo-cecal junction. The viscera were then placed into a plastic lined offal tray and become ready for dissection. After the total GIT weights were taken, the tract was tied and sectioned into esophagus, reticule- rumen, omasum, abomasum, small intestine, cecum and large intestine. The spleen and pancreas were generally removed first and weighted.

The external fat w[r]as removed from each organ of the foregut (rumen, omasum, and abomasum) and the cecum. The full fat-free organ

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weight was recorded. The rumen was emptied. Scraped as clean as possible without washing and then weighed.

The contents were homogenized and a one-liter sample was taken for dry matter analysis. The rumen was washed and weighed. The wet weight of the washed tissue and dry weight of each segment (organ) was determined. The omasum and abomasums were opened, emptied of their contents and washed. Their contents and their washed tissues were sampled for dry matter analysis. The weight of contents was calculated as the difference between the full and washed weights.

The large and small intestine was separated from the alimentary tract leaving some fat. The contents were removed, weighed and sampled. The fat was removed from the intestines leaving only the tissue, which was weighed.

The length of these organs was then measured. As soon as the tissues and digesta were taken, they were placed into a walk-in freezer at - 20 C and stored until analysis. The tissue samples from each organ were stored in an 11X20 cm whirl-Pak bags.

The dry matter analysis of the samples was conducted following the completion of the slaughter. The digesta dry matter was determined by thawing for 12 hours then homogenized and a sample of each organ's digesta taken from every individual animal. The samples were dried at 60 C for 48 hours.

Table(2)Formulation and chemical composition of the experimental rations (g/kg):

Ingredients	Control	Ration (1)	Ration (2)	Ration I
Concentrate*	1000	850	700	550
Silage	0	150	300	450
			Chemical compositi	
DM	886	847	814	781
CP	184	183	185	188
EE	29	32	31	30
CF	87	84	104	129
Ash	56	63	75	86
Ca	12	12	13	13
P	5.4	6.0	7.0	7.0
ME (MJ/kg)	11.4	11.4	10.7	10.1

*The composition of the concentrated feed is as follow: yellow corn 60%, soybean meal 25%, wheat bran 12%, vitamins and mineral premix 1%, limestone 1%. and NaCI 1%.

Table 3. Growth performance of Awassi lambs as affected by the experimental rations.

" ^ — - ^ ^ ^ Items Treatments^~~~~-~^^	Control	Ration (1)	Ration (2)	Ration (3)
Initial weight(Kg)	21.8	21.2	21.3	21.6
Final weight(Kg)	41.2	39.8	42.8	38.6
Total body gain				
From 0-30days	9.9	9.5	10.8	7.2
From 30-60 days	9.5	9.1	10.7	9.8
From 0-60 days	19.4	18.6	21.5	17.0
Daily body gain (Gr.)				
From 0-30days	330	317	360	240
From 30-60 days	317	303	357	327
From 0-60 days	323	310	359	283

Chemical compositions of the feed ingredients used in the experiment (DM, CP, CF, Ash, C fiber, Ca, and P) were determined according to **A. O. A. C. (1984).**

A one - way ANOVA was used to examine the effect of dietary silage using **SAS (1996).**

RESULTS AND DISCUSSION:

Experimental rations :

The rations used in the experiment were nearly similar in their chemical composition except the crude fiber content which increased with increasing the level of silage from 15-45 % in treated diets The contents of the experimental diets were consistent to diets fed in commercial fattening operations in palestine **(Abo Omar, 1995 and Hammad, 2001)** and fit the **NRC (1981)** requirements for lambs.

Growth performance:

The averages of total gain in lambs fed the four tested rations were 20.0, 20.0, 22.31 *,18.*\ kg respectively (Table 3). The differences among these values were not significant. The highest total and daily body gain were noted with lambs fed the ration which contained 30% silage. Gains observed in this experiment were similar to other gains of Awassi lambs reported by several investigators **(Abo Omar, 1995, Abo Omar and Gavoret, 1995, Hammad, 2001).**

The visceral organs:

The visceral organs under investigation were esophagus, trachea, lungs, heart, liver, kidneys, spleen, kidneys fat and pancreas, as show in table (4) . The results of visceral organs of lambs fed the diets had similar

weights of most of the tested organs except for the weight of kidneys and trachea. Diets had variable effects ($p<0.05$) on these two organs. Similar trends were reported by several researchers, were type of diet had variable effects on visceral organs **(Johnson, 1985 ;Abo Omar et al., 1994; Abo Omar, 1995 and Hammad, 2001,).**

Gastrointestinal tract:

The type of diet consumed had no clear influence on the digestive tract components (table5). However, lambs fed diet containing 30% silage had **a** higher ($p<0.05$) omasum wet weight as shown in table (5). Similar results were reported by **Abo Omar, et al., (1994)** in lambs fed different levels of fiber and by **Younoszai et al., (1987)** in monogastrics fed different roughage's and by **Sainz and Bently (1997)** in steers.

Gastrointestinal tract contents:

Contents of the rumen and most of other gastrointestinal tract segments in lambs fed the four diets were nearly the same (table 6), except for the contents of omasum and abomasum. The wet and dry content of these twoprevious organs were significantly ($p<0.05$) heavier in lambs fed diet containing 30% silage. These results are in agreement with other research where digestive tract content and all of its components were higher in lambs and steers fed more fiber in their diets **(Johnson, 1985; Abo Omar, et al. 1994 and Abo Omar, 1995).**

The experiment showed that the dressing percentages were 55, 56, 56 and 55% in lambs fed the experimental diets from 0 to 45% silage, respectively. No significant differences were found in dressing percentages (Table 6). This can be explained by the similar average weights of visceral organs, gastrointestinal components and the similar gastrointestinal tract contents observed in these lambs. The similar overall lambs body conditions and performance based on type of ration consumed can also explain the similar dressing percentage of these lambs. In any case, the dressing percent those were higher than values observed by previous research **(Abo Omar and Gavoret, 1995 and Hammad, 2001).**

CONCLUSION:

Feeding different levels of agricultural by-products silage proved to be of certain advantages to local livestock raisers, especially with sheep and lamb owners.. Utilizing of these pollutants as feed ingredients will

help in protection of the environment. More research are required in this area

Table 4. Visceral organs mean weights (X ± SE) in Jambs fed the experimental diets (g/kg carcass weight):

Parameter	Control	Diet (1)	Diet (2)	Diet (3)
Slaughter Wt.Kj	41.8	41.2	43.4	39.7
Carcass Wt., kg	23.3±1.0	23.5±.0	23.7±.9	22.2±1.0
Liver	359±12	332±15	337±16	359±15
Heart	84±3.5	67±3.9	70±4.1	66±3.5
Lungs	177±7.3	15I±8.1	184±9.7	170±8.5
Trachea	26°±1.2	49[a]±1.7	29[D]±1.3	29°±L4
Kidneys	61[a]±3.5	49[c]±3.6	59°±2.9	57[b]±2.8
Kid. Fat	4S±2.9	60±2.8	59±3.0	53±2.9
Pancreas	4±.2	4±.16	4±.2	4±.2
Spleen	38±2.1	36±2.0	43±2.4	27±1.8
Esophagus	23±1.9	19±1.8	18±1.6	14±1.5

Rows with different itters are significantly different at $p<0.05$ level.

Table 5. Effect of type of diet on gastrointestinal tract components (g/ kg carcass weight): X ± SE

Parameter	Control	Diet (1)	Diet (2)	Diet (3)
Rumen wet.	39.6±2.1	34.8±2.4	38.5±2.6	38.6±2.3
Rumen dry	7.9±.l	4.1±.l	6.5±.2	6.7i.2
Omasum wet	4.0b±.09	2.5c±.09	5.4a±. 1	4.4b±.l
Omasum dry	1.1±.006	0.5±.006	1.0±.005	0.8±.005
Abomasum wet	6.7±.l	6.1±.2	7.5±.25	8.9±.3
Abomasum dry	1.5±.09	1.4±.09	2.2±.I	1.8±.08
Small intes. wet	25.2±1.9	22.9±1.7	29.5±2.0	28.4±1.9
, Small intes. dry-	5.2±.l	5.5±.14	4.9±.2	5.1±.16
Large intes.& cecum wet	18.4±I.O	17.8±1.1	20.3±1.4	20.3±1.3
Large intes. & cecume dry	3.8±.08	3.8±.08	4.1±.09	3.2±.06
Length, small intestine (cmj	2900±22	2669±145	2966±15	2832±150

Rows with different litters are significantly different at $p<0.05$ level.

Table(6) . Effect of type of diets on gastrointestinal tract contents (g/kg carcass wt); X ± SE

Parameter	Control 0%	Diet(l)15%	Diet (2) 30%	Diet (3) 45%
Rumen content, wet	118.8±4.5	88.0±4.1	119.5*5.1	119.0±4.9
Rumen content ,dry	16.4±.9	12.0±.8	I0.8±.9	18.I±.7
Omasum content, wet	2.0^{b}±.01	$L4^{C}$±.01	5.5^{a}±.09	2.9^{b}±.0I
Omasum content, dry	0.7^{b}±002	0.3^{C}±.00I	$L2^{a}$±.0O5	0.5^{h}±,008
Abomasum content, wet	8,6"±,7	2.3^{C}±.9	$ll.4^{3}$±.8	6.6^{b}±9
Abomasum content,dry	$L0^{b}$±.01	0.2^{C}±.02	1.7^{a}±.02	$!.0^{b}$±.0l
Small intestine, wet	16.2*1.0	11.9*9	I8.3±l.l	18.2*1.2
Small intestine, dry	1.7±.02	l.5±.03	3.6±.03	2.5±.04
Large intestine & cecum, wet	30.7±U	24.9±1.5	30.6±1.2	35.4±l.3
Large intestine & cecum, dry	5.2±.8	3.3±.9	5.8±.8	6.3±.8
Dressing % 55	56	56	55	

Rows with different litters are significantly different at $p<0.05$ level.

REFERENCES:

A.O.A.C. (1984). Official Methods **of** Analysis. 14th edition. Assoc, of Officinal Analytical Chemists. Washington.

Abo Omar, J. (1995). Visceral organ mass of lambs fed different levels of olive cake. Islamic Univ. Journal. Vol. 3, No. 1, 150-160

Abo Omar, J. and L. Gavoret (1995). Utilizing olive cake in fattening rations. Vet. Med. Rev. Vol. 146, No. 4, 273-276

Abo Omar, J.; K. Johnson and D. Johnson (1994). Visceral organ mass of lambs fed four roughaee diets. An-Najah J. Res., Vol. II No. 8, 157-172.

Dunaif, G. and B. O. Sheeman (1981). The effect of dietary fiber on pancreatic enzyme activity in vitro. Amer. J. Clin. Nutr. 33, 575-583.

Hammad, W. (2001) Comparison and evaluation of awassi lambs fattening system in Palestine. MS. Thesis at An-Najah National University, Nablus, Palestine.

Johnson, C. L. (1985) Source and level of fiber alimentation on bovine visceral organ mass. M. S. Thesis, Colorado State University, Forth Collins, Colorado, USA.

Ministry of Agriculture (2000). Records on animal production and animal health. Palestinian National Authority.

N.R.C. (1981) Nutrient Requirements of Goats, Angora, Dairy and Meat Goats in Temperate and Tropical Countries. 15th Ed., National Academy Press, Washington, DC.

Pekas, J. C; J.Yen and W. G. Pond (1983) Gastrointestinal tract, carcass and performance traits of obese versus lean genotype swine. Effect of dietary fiber. Nutr. Rep. Int. 27, 257-259.

Rabayaa. I. (2000). Utilization of olive pulp by broilers. MS thesis, An-Najah N. University. Nablus, Palestine.

Sainz R. D. and B. E. Bently (1997). Visceral organ mass and cellularity in growth restricted and refed beef steers. J. Anim. Sci. 75, 129.

SAS. (1996). SAS Procedure Guide "Version 6.12th Ed.," SAS Institute Inc. Cary, NC, USA.

Younozai, M. K.; M. Adedoyin and J. Ranshaw (1978). Dietary components and gastrointestinal growth in rats. J. Nutr. 108.

تأثير التغذية على سيلاج بعض المخلفات الزراعية على وزن الجهاز الهضمي و ملحقاته في خراف العواسي

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أجريت هذه التجربة لمعرفة تأثير تغذية السيلاج المكون من بعض المخلفات الزراعية على معدل النمو ووزن الجهاز الهضمي و ملحقاته و محتوياته. استخدم في التجربة ٢٠ من خراف العواسي ، حيث قسمت الخراف الى أربع مجموعات احتوت كل مجموعه على خمسة خراف. غذيت الخراف في المجموعة الأولى على عليقة تسمين تجارية، بينما غذيت الخراف في المجموعة الثانية و الثالثة و الرابعة على السيلاج الذي أضيف الى العلائق بنسبة ١٥ ، ٣٠ ، ٤٥% على الترتيب من العلف المركز ،. و قد أضيف السيلاج ليحل محل نفس النسب من العلف المركز المستخدم في المجموعة الأولى. و قد غذيت الخراف انفراديا طوال فترة التجربة التي استمرت ٦٠ يوما. بينت التجربة ان السلاج لم يكن له تاثير معنوي على معدل النمو واوزان الأحشاء، الا أن الخراف التي غذيت بعلائق احتوت ١٥ % سيلاج تميزت بزيادة و نقص معنوي ($P<0.05$) في أوزان القصبة الهوائية و الكلى، على الترتيب. و كذلك فان السيلاج المقدم بنسبة ١٥ % ادى الى نقص معنوي ($P<0.05$ ( ) للوزن الطازج لام التلافيف و الأوزان الطازجة و الجافة لكل من محتوى ام التلافيف و الورقية، الا ان الخراف المغذاة على ٤٥ % سيلاج احتوت على معدل معنوي ($P<0.05$) في أوزان الأجزاء المذكورة أعلاه.