J. Agric. Sci. Mansoura Univ., 32 (8): 6135 - 6140, 2007

USING OF SPENT CEREALS STRAW WITH OLIVE CAKE AND SPENT CEREALS STRAW WITH TOMATO POMACE ON FATTENING AWASSI LAMBS

Al Barakeh, F.* ; F.A. Elyassin and M. Al Myzeid****

*** Jordan / National Center for Agric. Res. and Technology transfer**

****Agriculture faculty, Aleppo University**

ABSTRACT

This experiment was conducted to use spent cereals straw mixed with olive cake(SCO)and spent cereals straw mixed with tomato (SCT) from *Pleurotus ostreatus* mushroom as animal feed. In completely randomized design, twenty one male lambs, with initial weight 27±1.0 kg were allocated to three groups(1.untreated cereals straw (UCS), 2.Spent cereals straw with tomato pomace (SCT) and 3. Spent cereals straw with olive cake (SCO)).

The final live weight of the lambs received diets 1,2 and 3,44.4, 44.2 and 43. 3 kg respectively and their corresponding average daily gain were 191.0,189.0 and 178.0 g/day / animal. The average feed intake were 108.8, 107.0 and 97.0 kg in 90 days, respectively, which were significantly ($p<0.001$) lower for SCO. Feed conversion ratio was 6.33, 6.32 and 6.51 respectively, which were not statistically different among the groups. This experiment showed that the spent compost of the cereals straw with olive cake and cereals straw with tomato pomace can be used only as a roughage in the lambs fattening diets.

Keywords: Spent cereals straw with olive cake, spent cereals straw with tomato pomace and lambs fattening.

INTRODUCTION

In Jordan there is around 200,000 tons of straw and there is much interest in the possible use of cereal straws in ruminant livestock feeding ,also Jordan produce 25000 tons of olive cake and 500 tons of tomato pomace ,all these by products are characterized that contain high lignin, cellulose hemi cellulose and low digestibility, so its utilization by the animals is limited because of the low voluntary intake and their huge bulk which makes transportation more costly(Balch,1976).The crop residue contain 30-40% cellulose,16-27% hemi cellulose and 3-13% lignin(Chahal,1991).In order to increase the digestibility of the these by products the attention was increase to use the white-rot fungi because its capacity to remove the lignin preferentially(Pilon *et al*.,1982).According to Durrant *et al*.(1991) fungal cultivation resulted in considerable changes in the spent straw, remained after mushroom harvested ,leading to the increase of crude protein and cell-wall-soluble contents which might be more useful than untreated straw ,fed to ruminants. Meanwhile, inclusion of spent wheat straw obtained from cultivation of *Agaricus bisporous* mushroom in the diet of buffalo, up to 25%,resulted in a similar nutrient digestibility but a lower dry matter intake, comparing to the control diet(Langer *et al.*,1982).Adamovic *et al*.(1998)inculcated the *Pleurotus ostreatus* on wheat straw and they used the spent compost as a part of the cattle diet in a feeding trail lasted 57 days

* Corresponding author, Faisal Al Barakeh,faisal_barakeh@yahoo.com

,they found that steers would not consumed mixed ration with more than 17% dry matter of the spent compost. The decrease in daily gain and feed conversion was observed with increase of amount of spent compost .Fazaeli and Shafeyi (2005) reported that the spent compost straw could not be include up to 15% of the finishing lambs diet. Other researchers (El-tahan *et al* .,2003)found that the spent straw could replace concentrate feed mixture up to 40% for feeding growing lambs.

The aim of this work was to study the effect of spent cereal straw with olive cake and the spent of cereal straw with tomato pomace as a roughage on the growth performance of fattening lambs.

MATERIALS AND METHODS

Compost of *pleurotus ostreatus* spent cereal straw with olive(SCO) cake and cereals straw with tomato pomace(SCT)were obtained from a mushroom production unit (Al Khanasry station) in Jordan. The first compost had been made by mixing cereal straw (600 kg) ,olive cake (300kg),wheat bran (50 kg) and gypsum (50 kg). The second compost had been made by mixing cereal straw (600 kg) ,tomato pomace (300kg),wheat bran (50 kg) and gypsum (50 kg). After the mushroom harvesting (5 times)which was completed within 8to 10 weeks post spawning ,the bags of composed cereals straw with olive cake and cereals straw with tomato pomace were removed from the growing room, left in cement yard for sun drying ,samples for chemical analysis was taken.

Twenty one Awassi lambs with initial weight of 27±1.0 kg were housed in individual boxes and allocated to the experiment for 90 days. Three experiment diets were formulated

1.Control group, fed concentrate , and *adlibetum* untreated cereals straw (UCS).

2. Treatment group 1, fed concentrate and *adlibetum* spent cereals straw with olive cake (SCO).

3. Treatment group 2, fed concentrate and *adlibetum* spent cereals straw with tomato pomace (SCT).

All the lambs received their requirement from the concentrate (Table 2) according to NRC (1986), and *adlibetum* untreated cereals straw or spent cereals straw with olive cake and cereals straw with tomato pomace (Table 1). Cereals straw, spent cereals straw with olive cake, cereals straw with tomato pomace and concentrate were fed separated two times a day.

During the experiment, daily voluntary feed intake, body weight and daily gain of each lamb were individually recorded, feed conversion ratio were estimated. Data were statistically analyzed, according to the completed randomized design, using SAS GLM procedure (1996).

RESULTS AND DISCUSSION

Chemical composition:

Results of chemical composition showed (Table 1) that the spent by products remained from *Plerurotus ostreatus* cultivated contained a considerable amount of crude protein (CP).The restively higher amount of

CP in spent by products (from 4.46 to 9.59% in SCO and from 7.26 to 13.63 % in SCT)could be because this type of by products rich of microorganism .extra cellular enzymes and contained relatively a high level of nitrogen(Ball and Jackson ,1995).

Table(1) The chemicals analysis and fiber fraction of treated and untreated olive cake with cereals straw and tomato pomace with cereals straw(as DM basis) .

	UCS	SCO	UCO	SCT	UCT
Dry Matter	92.2	92.8	92	91.7	90.1
Organic Matter	76.90	81.57	88.42	77.21	81.90
Crude Protein	3.69	9.59	4.46	13.63	7.26
Crude Fiber	25.73	25.22	33.22	19.84	28.77
Ether Extract	0.37	0.40	1.79	1.82	3.35
Nitrogen free Extract	47.11	46.36	48.95	41.92	42,52
Ash	23.10	18.43	11.58	22.79	18.1
NDF	77.55	64.45	85.34	54.0	76.03
ADF	52.18	43.31	60.25	38.31	57.15
ADL	15.97	14.61	24.82	23.16	16.58
Cellulose	36.21	28.70	35.97	15.15	40.57
Hemi cellulose	25.37	21.14	25.09	15.69	18.88
Lignin	12.74	12.04	23.22	17.52	12.71

SCO=Spent cereals straw with olive cake.
UCO=Untreated cereals straw with olive cake.
SCT=Spent cereals straw with tomato pomace.
UCT= Untreated cereals straw with tomato pomace.
UCS= Untreated cereals straw.

The concentration of crude fiber (CF),neutral detergent fiber (NDF) and acid detergent fiber (ADF) were lower in the SCO and SCT comparing to the untreated ,however this by products contained a low level of organic matter (OM) and its utilization is limited because of high level of ash .The lower amount of NDF and ADF could be as a result of OM decreasing in the SCO and SCT,which similar to the result reported by others(Fazaeli and Shafey,2005;El-tahan *et al* .,2003 ; Mahrous and Abo Ammuo,2005) .

The high level of ash is due to the depletion and consumption of OM of straw by the fungi.The ash content of SCO and SCT increase form 11.58-18.43% and from 18.1 to 22.79% respectively,this result agreed with Adamovic *et al*.(1998), Fazaeli and Shafey(,2005)and El-tahan *et al* .,(2003).

The animal performance:

The animal performance results showed(Table 2) that the final weight of the lambs received untreated cereals straw (UCS),SCT and SCO were 44.4,44.2and 43.3kg ,the average daily gains were 191.0,188.8 and 177.9 g per animal respectively, which were significantly ($p<0.001$) higher for the animals received UCS and SCT. It could be as result of the lower SCO intake by the animals. The average quantity of USC,SCT and SCO received by the animals were 25.18, 23.2 and 16.1 kg during 90 days, respectively, which were significantly($p<0.001$) higher for UCS and SCT. According to Kakkar *et al*.,(1990),which utilized mushroom harvested spent straw as feed for

buffaloes ,the voluntary intake decreased due to the relatively high content of ash in the diet .

Table (2).Formulation of the experiment diets fed to Awassi lambs.

Ingredients	**percents**
Barley grain	50.0
Corn grain	30.0
Soybean meal	11.0
Wheat bran	7.0
Salt	1.0
Limestone	1.0
Chemical analysis	
Crude protein %	13.20
ME(Mcal/ kg)	2.66
TDN %	74.70

***Mc Donald,73**

Also fazaeli and shafey (2005) reported that the utilization of the spent straw by the animals is limited because of the low organic matter and high mineral content ,which may reduce its acceptability and nutrient balance and they reported that the spent compost straw could be include up to 15% per 100kg of the diet for finishing lambs. The results in (Table 2) shows the amount of UCS ,SCT, and SCO rejected by the animals,6.82,8.8,and 15.9 kg, which were significantly ($p<0.01$) higher for USC. This means that the animals not prefer spent *pleurotus* compost ,this result agreed with Adamovic *et al*.(1998); Kakkar *et al*.,(1990).

Table(3)Feed intake and refusal, initial and final live weights, total feed efficiency and gain and average daily gain

Variable				
	UCS	**SCT**	**SCO**	**Significance**
Roughage (Kg)	32.00	32.00	32.00	
Refused	6.82±1.5[a]	8.8±1.16[b]	15.9±82[c]	***
Consumed	25.18±1.08[a]	23.2±1.5[b]	16.1±.4[c]	***
Concentrate (Kg)				
Consumed	83.8±1.58	83.8±1.58	80.7±1.58	NS
Initial weight (kg)	27.2±1.0	27.3±1.0	27.4±1.0	NS
Final weight (kg)	44.4±0.7	44.2±0.7	43.3±0.7	NS
Kg feed intake/head/day	1.21±0.02[a]	1.19±0.02[a]	1.08±0.02[b]	***
Total feed efficiency	6.34±0.35	6.33±0.35	6.10±0.37	NS
Total gain (kg)	17.2±0.7	16.9±0.7	15.9±0.8	NS
Average daily gain (g/d)	191±8	188±8	177±9	NS

[a,b,c]Means within the same row with different superscripts differ according to the indicated level of significance
NS = non significant; *** = P<0.001;

CONCOLUTION

A considerable by products degradation is achieved by the influence of *Pleurotus ostreatus* enzymes, particularly of cell wall components, cellulose, hemi cellulose and lignin. From the results obtained in this study it is not possible to conclude that the nutritive value of the cereals straw mixed with

olive cake and mixed with tomato pomace was improved during mushroom production. So it could be used as a roughage only.

ACKNOWLEDGMENTS

The author wish to thanks the National Center for Agricultural Research and Technology Transfer (NCARTT), and Middle East Regional Agricultural Program.

REFERENCES

Adamovic,M.,Grubic,G.,Milenkovic,I.Jovanovic,R.Protic,R.Sretenovic and L.Stoicevic.(1998).The obi degradation of wheat straw by *Pleurotus ostreatus* Anim.Food Sci.Tech.,71:357-362.

Balch,C.C.(1976).The potential of poor quality agriculture roughages for animal feeding.FAO.paper No. 4,Rome.

Ball,A.S.and A.M.Jackson.(1995).The recovery of lignocelluloses-degrading enzymes from spent mushroom compost.Bio-resource Technology. 54: 311-314

Chahal, D.S. (1991). Lignocelluloses wastes: Biological conversion: Bioconversion of waste materials industrial products. Elavier Applied science London.pp.373-400.

Durrant,A.J.,D.A.Wood and R.B.Cain.(1991).Lignocellulose biodegradation by *Agaricus bisporus* during solid state substrate fermentation. J. General Microbiol.137:751-755.

El-tahan,A.A.H.,G.A.Abd El-Rahman, M.A.Sarhan and F.F.Abo Ammo (2003). Utilization of mushroom by-products for feeding ruminant.2. Utilization of mushroom by-products for feeding sheep. Egyptian J. Nutrition and feed .6(Special Issue):879-890

Fazaeli,H.and H.Shafeyi.(2005).Using of Mushroom Spent Straw Compost as Animal Feed. Proceeding of the fifth International Conference on Mushroom Biology and Mushroom Product.PP.291-295

Kakkar ,Vk.,H.S. Garch,S. Dhanda and G.S. Makker. (1990). Mushroom harvested spent straw as feed for buffaloes .Indian J. Anim. Nutr. 7(4): 267-272.

Langer,P.N., J.P.Sehgal, V.K.Rana, M.M.Singh and H.S. Garcha. (1982). Utilization of *Agaricus bisporus* harvested spent wheat straw in the ruminant diets.Indian.J.Anim.Sci.52(8):634-637.

Mahrous A.A and F.F.Abo Ammou.(2005).Effect of biological treatment for rice straw on the productivity performance of sheep. Egyptian J. Nutrition and feed 8(Special Issue):529-540.

N.R.C.(1986). Nutrient Requirement of Domestic animals: Nutrient requirement of sheep.National Research Council, Washington, D.C., U.S.A.

Pilon,s.,M.Barde and M.J.Uraseki. (1982). Fungal treatment .Biotechnol Bioeng. 24:2067-2076.

SAS. (1996).SAS Users Guide: Statistic .SAS Ins.Inc.Editors,Cary,NC.

تأثير استخدام التبن مع تفل الزيتون والتبن مع تفل البندوره ألمزروع عليها فطر عيش الغراب ألمحاري في تسمين الخراف العواسي.

فيصل البركه[1] ،فايز الياسين[2] و محي المزيد[2]
١ .المركز الوطني للبحوث ألزراعيه ونقل التكنولوجيا.الأردن
٢ .قسم الإنتاج الحيواني-كلية ألزراعه-جامعة حلب.

أجريت هذه الدراسة لمعرفة تأثير إستخدام التبن مع تفل الزيتون والتبن مع تفل البندوره المحصود عنها فطر عيش الغراب ألمحاري(*Pleurotus ostreatus*) في تسمين الخراف.

إستخدم بهذه الدراسة إحدى وعشرون خروف عواسي بعمر ثلاثة شهور وبمعدل وزن 27±1.0 كغم وزعت عشوائيا. على مجموعتين بأقفاص تغذيه مفرده،قدم للمجموعة ألأولى أتبان لم يزرع عليها فطر،وقدم للمجموعة الثانية تبن مع تفل بندوره زرع عليه فطر عيش الغراب ألمحاري والثالثه تبن مع تفل زيتون زرع عليه فطر عيش الغراب ألمحاري

وقد غذيت جميع الخراف أعلاف مركزه طبقا لمقررات NRC لعام ١٩٨٦ ،أما الأتبان فقد قدمت بشكل حر وسجلت الكميات ألمتناوله والمتبقية. إستمرت التجربة تسعون يوما.

أظهرت ألنتائج أن وزن الخراف النهائي قد وصل إلى ٤٤,٢،٤٤،٤٤ و ٤٣,٣ ،على التوالي ولم يلاحظ فروقات معنويه بين المجاميع. .وقد بلغ معدل الزيادة ألوزنيه أليوميه ١٩١,٠ ،١٨٤.٠ و 7١٧ غم / يوم على التوالي ولم يلاحظ فروقات معنويه بين المجاميع ،وبلغت الزيادة ألوزنيه الكلية ١٧,٢ 16,9 ,,و15.9 على التوالي و.لم و يلاحظ فروق معنوية. وكذلك لم يلاحظ فروق معنوية بين المجاميع.

.تبين نتيجة هذه الدراسة ان الاتبان ،الاتبان مع تفل الزيتون والأتبان مع تفل البندوره التي استخدمت لزراعة الفطر يمكن استخدامها كعلف مالئ فقط.