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EFFECT OF FEEDING MUSHROOM CULTIVATING BY- PRODUCTS ON PERFORMANCE OF PREGNANT AND SUCKLING EWES.

Moawd, R.I.
Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt.

ABSTRACT

This study was conducted to investigate the effects of feeding spent wheat straw (SWS), a by-product of mushroom cultivation *ad lib.* with different concentrate levels (70, 60 and 50% from TDN requirement) on digestibility and performance of ewes and their lambs during gestation and suckling periods. Twenty four cross-bred pregnant ewes (Suffolk × Ossimi) about 63 kg in weight and 2.5 – 3 years in age were used. The animals were divided according to their body weights into 4 groups (6 in each), to evaluate the following rations :

Ration (A): 70% of TDN requirement from concentrate feed mixture (CFM) + berssem hay (BH) supplemented with 10% molasses *ad lib.*

Ration (B): 70% of TDN requirement from CFM + spent wheat straw (SWS) supplemented with 10% molasses *ad lib.*

Ration (C): 60% of TDN requirement from CFM + SWS supplemented with 10% molasses *ad lib.*

Ration (D): 50% of TDN requirement from CFM + SWS supplemented with 10% molasses *ad lib.*

The main results could be summarized as follows :

1- The DM intake, digestibilities of most nutrients and nutritive values were decreased with increasing SWS proportion in the rations during gestation and suckling periods.
2- Rations (A), (B) and (C) and rations (A) and (B) were covered the nutritional requirements of ewes during gestation and suckling periods, respectively.
3- Rations (A) and (B) recorded the best values of milk as quantity and quality during suckling period.
4- Improved weaning weight and daily gain were recorded for lambs born from ewes fed rations (A) and (B) during suckling period.
5- Using SWS in sheep nutrition decreased feed cost.

Keywords: pregnant ewes, suckling lambs, milk production, spent wheat straw

INTRODUCTION

In Egypt, agriculture cellulolytic wastes produced annually are about 21 million tons year (Deraz, 1996). Only 4 to 4.3 million tons of crop residues are used for ruminant feeding (El-Shinnawy, 1990 and Hathout and El-Nouby, 1990) and the other crop residues are burned or wasted hence lead to environmental pollution and consequently health hazards.

High lignification and low crude protein, energy, minerals and vitamins contents in the agriculture residues make them of poor palatability and less nutritious. Physical, chemical and microbiological treatments of cellulosic materials have been tried for improving the nutrient availability from such materials to the animals (Langar *et al.*, 1980).

The spent wheat straw, a by-product of mushroom cultivation, can be used as a feed ingredient in ruminant diets (Zadrazil, 1973 and Langar *et al.*, 1982). Bakshi and Langar (1985) showed that the nitrogen from spent wheat straw is available to the buffaloes when incorporated in the pelleted concentrate mixture. The spent wheat straw, can be used with concentrate mixture and green fodder up to 30% in sheep rations (Ahuja *et al.*, 1986). Bakshi and Langar (1991) reported that *Agaricus bisporus* spent wheat straw mixed with wheat straw and 200g cereal can meet the daily DCP and TDN requirements of an adult ruminant. Also, the mycostraw (spent straw), which is a rich source of protein, can be used as feed for ruminants (Kakkar and Dhanda, 1998).

The aim of this study was to investigate the effects of feeding spent wheat straw (SWS), a by-product of mushroom cultivation *ad libitum* with different concentrate feed mixture levels (70, 60 and 50% of TDN requirement) on digestibility and performance of ewes and their lambs during gestation and suckling periods.

MATERIALS AND METHODS

This study was conducted at El-Gemeza experimental Station, Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture,Egypt,to study the effects of feeding spent wheat straw a by-product of mushroom cultivation (*Agaricus bisporus*) *ad lib.* with different concentrate levels (70, 60 and 50% of TDN requirement) on digestibility and performance of ewes and their lambs during gestation and suckling periods.

The spent wheat straw was collected from El-Tarotty Farm, Faqous, Sharkia Governorate. The cultivating media consisted of wheat straw treated with ammonium sulfate (13% of total concentration, by weight) and layer dropping (65% of total concentration, by weight). The waste material residues of mushroom cultivating so called spent wheat straw (SWS) were washed and sun-dried and used in the experimental rations.

Twenty four cross-bred pregnant ewes (Suffolk × Ossimi) averaged 63 kg in weight and 2.5 – 3 years in age were used in the experiments. They were randomly assigned to 4 groups (6 in each) to evaluate the following rations :

Ration A : 70% of TDN requirement from concentrate feed mixture (CFM) + berssem hay (BH) supplemented with 10% molasses *ad lib.*

Ration B : 70% of TDN requirement from CFM + spent wheat straw (SWS) supplemented with 10% molasses *ad lib.*

Ration C : 60% of TDN requirement from CFM + SWS supplemented with 10% molasses *ad lib.*

Ration D : 50% of TDN requirement from CFM + SWS supplemented with 10% molasses *ad lib.*

Molasses was added at level of 100 gm per 900 gm BH or SWS directly before feeding.

The nutritional requirements for the ewes were calculated according to the allowances of the NRC (1986).

The nutritive values of CFM on DM basis (by indirect method according to Abou – Raya, 1967) were 57.98, 50.24 and 12.24% for TDN, SE and DCP, respectively.

The experiments were conducted in three stages : 1st stage (First 15 weeks of gestation), 2nd stage (last 6 weeks of gestation) and 3rd stage (first 8 weeks of suckling).

Twelve digestibility trials, (4 rations × 3 stages) were conducted using three ewes in each one to determine the digestion coefficients of various nutrients and feeding values of the experimental rations. All ewes were individually housed in metabolic cages. Water was offered as desire. Vitamin and mineral blocks were provided freely. Samples from feeds and feces were collected daily during collection period (7 days) for chemical analysis.

The milk yield of each ewe was recorded weekly through the 1st 8 weeks of suckling, twice daily at 7 a.m. and 5 p.m. . The lambs were separated from their dams at 5 p.m. the day of milk assessment. The lamb-suckling technique was used. The composite sample of each ewe was taken for analysis.

During the 3rd period, birth weight, daily gain, weaning weight and mortality rate (as percent of lambs died from birth to weaning of total lambs born) were recorded.

The official methods of A.O.A.C. (1990) were used for running the proximate chemical analysis of tested feedstuffs, feces and milk.

Analysis of variance was carried out using F. test, according to Snedecor and Cochran (1982) and the differences among treatments means were tested using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition:

The chemical composition of berssem hay (BH) and spent wheat straw (SWS) were within the range reported by Etman and Soliman (1999) and Talha *et al.* (2001) for BH and Bakshi and Langar (1985 and 1991), Arora *et al.* (1994) and Kakkar and Dhanda (1998) for SWS (Table 1).

Table (1) : Chemical composition of feedstuffs (on DM basis).

Items	DM	Composition, % DM basis					
		OM	CP	CF	EE	NFE	ASH
Concentrate feed mixture (CFM)*	91.33	89.20	16.82	12.56	4.02	55.80	10.80
Berssem hay (BH)	86.90	85.60	14.42	32.40	1.55	37.23	14.40
Spent wheat straw (SWS)	92.70	64.40	12.30	15.10	1.02	35.98	35.60
Molasses	76.58	88.10	5.17	---	---	82.93	11.90
Berssem hay + 10% Molasses	86.03	85.80	13.55	29.96	1.39	40.90	14.20
Spent wheat straw + 10% Molasses	91.30	66.80	11.60	13.93	0.97	40.30	33.20

* The ingredients of concentrate feed mixture (CFM) were : 39% yellow corn, 29% undecorticated cottonseed meal, 14% rice bran, 9% soybean meal, 5% vines, 3% , limestone and 1% salt.

Digestibility trials:

Feed intake:

The DM intake as kg/100kg B.W. or per g/kg $W^{0.75}$ decreased with increasing SWS levels in rations (C) and (D) during the three periods as shown in Table (2). These results agree with those obtained by Langar *et al.* (1982) and Bader (1993). While the intake of SWS by ewes was increased with increasing SWS level in rations (C) and (D) to cover their nutritional requirements. These results agree with those obtained by Bakshi *et al.* (1985) who found that the daily consumption of SWS was increased with feeding buffaloes due to its soft texture and the daily consumption of SWS when fed alone was 9 kg DM indicating its acceptability by the animals.

Digestibility:

The DM digestibility of ration (A) was significantly ($P<0.05$) higher than others through gestation period, but insignificantly higher than ration (B) during suckling period (Table 2). It showed that the DM digestibility was decreased with increasing SWS in the rations. These results agree with those obtained by Bader (1993) who found that DM digestibility was 69.91, 56.21, 45.13 and 42.53% for rations containing 0, 45, 70 and 90% SWS, respectively. As shown in Table (2), the OM, CP and NFE digestibilities were decreased with decreasing concentrate ratio in the rations during the three periods. These results may be due to increasing ash content of these rations as SWS proportion was increased as reported by Chandra *et al.* (1991) and Bader (1993).

On the other hand, the CF digestibility of ration (D) was significantly ($P<0.05$) higher than rations (A) and (B) during the three periods. It showed that the CF digestibility was decreased with increasing concentrate ratio in the rations which may be attributed to the increase of soluble carbohydrates which adversely affected rumen environment and reduced fiber digestion in the rumen (Bakshi and Langar, 1985 ; Schneider *et al.*, 1985 and Talha *et al.*, 2001).

The variations in the digestibility of feed was due to the changes in the chemical composition and was inversely related to the content of nutrient in the diet (Schneider and Lucas, 1950).

Nutritive values and feed units intake:

The nutritive values as TDN and DCP were significantly ($P<0.05$) higher for ration (A) compared with the other rations during the three periods as shown in Table (3). The data revealed that, the TDN and DCP of rations containing SWS were significantly ($P<0.05$) lower as a reflection of reduced of digestibilities of most nutrients and because of higher ash content of SWS (Chandra *et al.*, 1991). The present findings indicated that the inclusion of SWS in the rations resulted in decreasing the feeding values of the ration as a result of high ash content of SWS, which is in agreement with Ahuja *et al.* (1986) and Bader (1993).

The results of feed units intake during gestation period showed that ration (A) had the highest ($P<0.05$) values of TDN and DCP intake as kg/kg $W^{0.75}$ (Table 3). During suckling period, the results showed that, rations (A) and (B)

Table (2): Daily feed intake and digestibility of the experimental rations during gestation and suckling periods by ewes.

Items	First 15 weeks of gestation				Last 6 weeks of gestation				First 8 weeks of suckling			
	A	B	C	D	A	B	C	D	A	B	C	D
Daily DM intake (g/h/d) :												
CFM	887	887	748	635	1316	1299	1106	909	1696	1680	1413	1178
BH	533	——	——	——	569	——	——	——	524	——	——	——
SWS	——	573	607	685	——	591	714	811	——	605	782	917
Total DM intake (g/h/d)	1420^{ab} ± 25.17	1460^{a} ± 12.35	1355^{bc} ± 26.66	1320^{c} ± 33.47	1885^{a} ± 20.30	1890^{a} ± 20.48	1820^{a} ± 15.72	1720^{b} ± 30.17	2220	2285	2195	2095
Total DM intake (kg/100kg BW)	2.22^{a} ± 0.01	2.28^{a} ± 0.02	2.15^{b} ± 0.02	2.06^{c} ± 0.03	2.51^{ab} ± 0.03	2.55^{a} ± 0.04	2.48^{b} ± 0.03	2.37^{c} ± 0.03	4.11^{ab} ± 0.10	4.27^{a} ± 0.06	4.18^{a} ± 0.06	3.99^{b} ± 0.04
Total DM intake (kg/kgW$^{0.75}$)	62.75^{ab} ± 0.39	64.52^{a} ± 0.42	60.60^{b} ± 0.66	58.33^{c} ± 0.97	73.95^{ab} ± 0.54	74.91^{a} ± 0.63	72.51^{b} ± 0.35	69.22^{c} ± 0.60	111.45^{ab} ± 2.23	115.52^{a} ± 1.66	112.56^{ab} ± 1.04	107.44^{b} ± 0.82
Digestion coefficients, % :												
DM	68.31^{a} ± 0.38	65.11^{b} ± 0.37	63.75^{bc} ± 0.34	62.33^{c} ± 0.38	69.13^{a} ± 0.18	67.33^{b} ± 0.39	65.39^{c} ± 0.22	63.62^{d} ± 0.33	69.36^{a} ± 0.42	67.84^{ab} ± 0.37	66.73^{b} ± 0.20	54.20^{c} ± 0.20
OM	70.21^{a} ± 0.29	69.89^{a} ± 0.07	67.93^{b} ± 0.23	66.83^{b} ± 0.31	71.43^{a} ± 0.33	70.89^{ab} ± 0.17	70.06^{b} ± 0.21	67.50^{c} ± 0.17	72.10^{a} ± 0.26	71.86^{ab} ± 0.16	70.45^{bc} ± 0.34	68.92^{c} ± 0.35
CP	70.52^{a} ± 0.38	65.10^{b} ± 0.21	64.80^{b} ± 0.23	62.20^{c} ± 0.12	72.21^{a} ± 0.40	67.80^{b} ± 0.21	65.85^{c} ± 0.21	62.71^{d} ± 0.30	72.50^{a} ± 0.38	68.08^{b} ± 0.21	66.13^{c} ± 0.37	64.13^{d} ± 0.27
CF	52.11^{c} ± 0.37	54.05^{bc} ± 0.51	56.08^{ab} ± 0.31	56.98^{a} ± 0.27	52.31^{b} ± 0.40	53.50^{b} ± 0.28	56.87^{a} ± 0.27	57.14^{a} ± 0.40	53.05^{b} ± 0.19	54.74^{b} ± 0.27	57.90^{a} ± 0.40	59.49^{a} ± 0.36
EE	77.49^{b} ± 0.40	80.56^{a} ± 0.75	77.29^{b} ± 0.59	75.87^{b} ± 0.47	79.82^{ab} ± 0.26	80.16^{a} ± 0.28	78.51^{bc} ± 0.24	77.75^{c} ± 0.40	80.09 ± 0.42	80.22 ± 0.60	79.44 ± 0.23	77.80 ± 0.41
NFE	76.56^{a} ± 0.54	74.88^{a} ± 0.08	71.55^{b} ± 0.43	70.47^{b} ± 0.46	77.30^{a} ± 0.49	75.69^{ab} ± 0.27	74.31^{b} ± 0.33	71.20^{c} ± 0.15	77.53^{a} ± 0.42	76.75^{ab} ± 0.29	74.48^{bc} ± 0.55	72.39^{c} ± 0.62

a, b, c and d means in the same row of each period with different superscripts differ ($P < 0.05$).

Table (3): Nutritive values and feed units intake by ewes fed the experimental rations during gestation and suckling periods.

Items	First 15 weeks of gestation				Last 6 weeks of gestation				First 8 weeks of suckling			
	A	B	C	D	A	B	C	D	A	B	C	D
Nutritive values (%) :												
TDN	64.67^{a}	59.04^{b}	56.35^{c}	54.14^{d}	66.21^{a}	61.33^{b}	59.10^{c}	55.60^{d}	67.13^{a}	63.06^{b}	60.16^{c}	57.34^{d}
	± 0.28	± 0.10	± 0.20	± 0.27	± 0.29	± 0.16	± 0.20	± 0.16	± 0.25	± 0.23	± 0.33	± 0.30
DCP	11.00^{a}	9.62^{b}	9.38^{c}	8.78^{d}	11.43^{a}	10.30^{b}	9.73^{c}	9.01^{d}	11.64^{a}	10.51^{b}	9.89^{c}	9.32^{d}
	± 0.08	± 0.06	± 0.06	± 0.02	± 0.10	± 0.06	± 0.06	± 0.08	± 0.12	± 0.07	± 0.11	± 0.07
Daily feed units intake :												
TDN g/h/d	918.31^{a}	861.98^{b}	763.54^{c}	714.65^{d}	1248.06^{a}	1159.14^{b}	1075.62^{c}	956.32^{d}	1490.29^{a}	1440.92^{a}	1320.51^{b}	1201.27^{c}
	± 19.63	± 6.88	± 10.03	± 15.28	± 4.57	± 7.51	± 10.53	± 12.56	± 25.38	± 25.06	± 23.18	± 16.02
$kg/kgW^{0.75}$	40.58^{a}	38.09^{b}	34.15^{c}	31.58^{d}	48.96^{a}	45.94^{b}	42.85^{c}	38.48^{d}	74.81^{a}	72.85^{a}	67.72^{b}	61.60^{c}
	± 0.46	± 0.14	± 0.25	± 0.41	± 0.15	± 0.24	± 0.09	± 0.16	± 0.70	± 0.63	± 0.35	± 0.14
DCP g/h/d	156.20^{a}	140.45^{b}	127.16^{c}	115.90^{d}	215.46^{a}	194.67^{b}	177.09^{c}	154.97^{d}	258.41^{a}	240.15^{b}	217.09^{c}	195.25^{d}
	± 3.98	± 1.37	± 1.96	± 2.89	± 0.63	± 1.15	± 1.83	± 1.84	± 4.43	± 4.89	± 3.78	± 2.43
$kg/kgW^{0.75}$	6.90^{a}	6.21^{b}	5.68^{c}	5.12^{d}	8.45^{a}	7.72^{b}	7.06^{c}	6.24^{d}	12.97^{a}	12.14^{b}	11.13^{c}	10.01^{d}
	± 0.10	± 0.03	± 0.06	± 0.08	± 0.02	± 0.08	± 0.02	± 0.03	± 0.12	± 0.11	± 0.06	± 0.05

a, b, c and d means in the same row of each period with different superscripts differ ($P < 0.05$).

had the highest (P<0.05) value of TDN intake as kg/kg $W^{0.75}$ and ration (A) had the highest (P<0.05) value of DCP intake as kg/kg $W^{0.75}$, while ration (D) had the lowest (P<o.o5) values of feed units intake as TDN and DCP during gestation and suckling periods.

From the previous data, it could be noticed that, the feed units intake as TDN and DCP decreased with increasing SWS levels in the rations. On the other hand, the present findings indicated that the TDN intake as g/h/d for ewes fed ration (D) during gestation period and rations (C) and (D) during suckling period were lower than the recommended level of NRC (1986).

Performance of ewes during 1st 8 weeks of suckling period:

Milk yield :

From the data in Table (4) and Figure (1), it could be seen that the milk yield of ewes fed different rations increased up to 4th week (peak of lactation) then decreased. These results agree with those obtained by Samak *et al.* (1982) and El-Tahan (1996). The milk yield of ewes fed rations (A) and (B) was significantly (P<0.05) higher than those fed rations (C) and (D) during most weeks of suckling period and in average of the period which may be due to higher DM intake and higher CP intake and digestibility (Tables 1 and 2) as reported by Kholif (2001). Also, the feed unit intake of TDN as g/h/d for ewes fed rations (C) and (D) was lower than the recommended level of NRC(1986).

Many factors may affect milk yield such as breed of ewes, number of suckled lambs, feeding level and age of ewes (Abdel-Karim, 1981 and Latif *et al.* 1988). West *et al.* (1998) reported that, a consistently high DM intake is critical to supply the nutrients that are necessary to support high milk yield by dairy cows.

From the previous data, it could be noticed that milk yield decreased with increasing SWS in the rations.

Table (4): Average daily milk yield (gm) for ewes fed the experimental rations during first 8 weeks of suckling.

Items	Rations			
	(A)	(B)	(C)	(D)
Weeks				
1	$698.50^{a} \pm 10.21$	$684.60^{ab} \pm 5.80$	$668.13^{b} \pm 4.41$	$638.20^{c} \pm 9.00$
2	$758.30^{a} \pm 10.08$	$738.35^{ab} \pm 9.56$	$717.70^{b} \pm 6.82$	$673.90^{c} \pm 8.31$
3	$848.80^{a} \pm 10.01$	$826.40^{a} \pm 8.47$	$788.41^{b} \pm 11.75$	$741.20^{c} \pm 8.63$
4	$958.70^{a} \pm 11.72$	$942.12^{a} \pm 7.03$	$885.65^{b} \pm 8.22$	$831.22^{c} \pm 7.33$
5	$942.30^{a} \pm 7.39$	$922.41^{a} \pm 5.77$	$837.80^{b} \pm 6.21$	$788.65^{c} \pm 8.26$
6	$820.00^{a} \pm 6.43$	$797.70^{a} \pm 8.61$	$702.77^{b} \pm 9.64$	$652.17^{c} \pm 7.27$
7	$680.00^{a} \pm 6.85$	$639.03^{b} \pm 9.55$	$537.52^{c} \pm 6.00$	$512.40^{d} \pm 9.58$
8	$505.00^{a} \pm 6.65$	$465.90^{b} \pm 8.50$	$401.10^{c} \pm 7.56$	$367.25^{d} \pm 7.68$
Average	$776.45^{a} \pm 20.65$	$752.06^{a} \pm 21.56$	$692.39^{b} \pm 21.08$	$650.62^{b} \pm 20.81$

a, b, c and d means in the same row with different superscripts differ (P < 0.05).

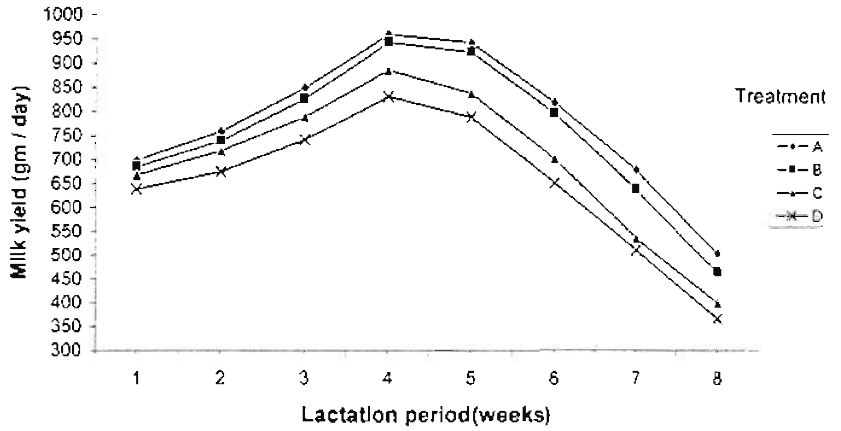

Fig. (1) : Lactation curve of the different experimental rations.

Milk chemical composition :

Milk fat and protein contents declined in the early weeks of lactation and then increased gradually till the end of lactation period (Corbett, 1968).

Milk total solids (T.S) and solids not fat (SNF) contents at the 4th week (peak) of ewes fed ration (A) showed the highest ($P<0.05$) values than others (Table 5). Others milk contents (fat, lactose and ash) were not significantly different among treatments except milk CP content of ewes fed rations (A) and (B) which was significantly ($P<0.05$) higher than those fed ration (D). This may be due to higher CP content of rations and higher CP and OM digestibilities of rations fed or higher nutritive values of rations as reported by Kholif (2001).

Table (5): Milk composition (%) of ewes fed the experimental rations at the 4th week (peak).

Items	Rations			
	(A)	(B)	(C)	(D)
T.S	$19.19^{a} \pm 0.02$	$19.09^{b} \pm 0.01$	$19.06^{b} \pm 0.01$	$19.05^{b} \pm 0.01$
SNF	$12.29^{a} \pm 0.02$	$12.20^{b} \pm 0.01$	$12.15^{bc} \pm 0.02$	$12.14^{c} \pm 0.01$
Fat	6.90 ± 0.02	6.89 ± 0.01	6.91 ± 0.02	6.91 ± 0.02
Protein	$6.51^{a} \pm 0.02$	$6.44^{ab} \pm 0.03$	$6.38^{bc} \pm 0.03$	$6.34^{c} \pm 0.02$
Lactose	4.91 ± 0.03	4.87 ± 0.02	4.87 ± 0.01	4.88 ± 0.01
Ash	0.87 ± 0.06	0.89 ± 0.03	0.90 ± 0.03	0.92 ± 0.04

a, b and c means in the same row with different superscripts differ ($P < 0.05$).

From the previous data, it could be seen that milk of ewes fed rations (A) and (B) had the highest values for T.S, SNF, protein and lactose contents, while milk of ewes fed ration (D) had the highest values for fat and ash contents due to increasing SWS as a roughage in the ration. The results of milk composition were within the normal values which agree with those reported by El-Tahan (1996) for ewes milk.

Growth of suckling lambs :

The differences of birth weight between lambs born from ewes fed different rations did not reach to the significant level (Table 6). These results are in agreement with those reported by (Padula *et al.*, 1992 and Shahin, 2000). The averages of weaning weight, total gain and daily gain of lambs fed rations (A) and (B) were significantly ($P<0.05$) higher than others (Table 6).

Many factors influence pre-weaning growth of lambs such as breed, type of birth, sex of lamb and nutrition during pregnancy especially late gestation and lactation periods and additional ration of the lamb by the 5th week of age (Swidan *et al.*, 1982 and Shahin, 2000).

Moreover, the lower mortality percentage was recorded for lambs born from ewes fed rations (A) and (B) as shown in Table (6). Several factors contributing to these losses such as birth weight, nutrition of ewes, season of lambing birth type, low level of milk production of the ewes and breed of ewes (Willingham and Shelton, 1990).

From the previous data, it could be noticed that averages weaning weight and daily gain of lambs were decreased with increasing SWS in the rations. On the other hand, the mortality percentage took an opposite trend of weaning weight and daily gain.

Table (6):Average performance of lambs born to ewes of the different experimental rations.

Items	Rations			
	(A)	(B)	(C)	(D)
Av. birth weight (kg)	3.87 ± 0.12	3.79 ± 0.07	3.70 ± 0.06	3.63 ± 0.09
Av. Weaning weight (kg)	15.73^{a} ± 0.49	15.17^{a} ± 0.65	13.50^{b} ± 0.46	13.05^{b} ± 0.68
Total gain (kg)	11.86^{a} ± 0.45	11.38^{a} ± 0.68	9.80^{b} ± 0.49	9.42^{b} ± 0.63
Av. daily gain (kg)	0.212^{a} ± 0.01	0.203^{a} ± 0.01	0.175^{b} ± 0.01	0.168^{b} ± 0.01
Mortality of lambs (%)	12.50	14.29	20.50	16.67

a and b means in the same row with different superscripts differ ($P < 0.05$)

Economical studies:

From the data in Table (7), it could be seen that using SWS in rations decreased the cost of feeding of ewes when compared with those fed on the ration (A).

Table (7): Ingredients and prices of the experimental rations / head during the three periods.

Items	Rations			
	A	B	C	D
First 15 weeks of gestation :				
Total feed intake as fed (kg) :				
CFM	103.59	103.59	88.64	74.04
BH	70.79	———	———	———
SWS	———	70.15	74.18	82.11
Cost of feed consumption (LE)	108.84	83.30	72.41	62.10
% of cost from ration (A)	100	76.53	66.53	57.06
Last 6 weeks of gestation :				
Total feed intake as fed (kg) :				
CFM	58.91	58.91	50.49	42.08
BH	29.29	———	———	———
SWS	———	28.06	34.59	39.70
Cost of feed consumption (LE)	57.07	46.42	40.64	34.74
% of cost from ration (A)	100	81.34	71.21	60.87
First 8 weeks of suckling :				
Total feed intake as fed (kg) :				
CFM	105.89	105.89	90.75	75.66
BH	36.84	———	———	———
SWS	———	39.07	49.99	57.41
Cost of feed consumption (LE)	95.63	82.55	72.06	61.34
% of cost from ration (A)	100	86.32	75.35	64.14

Price (L.E.) per ton :
CFM = 750 (LE) **BH + 10% molasses = 440 (LE)**
SWS + 10% molasses = 80 (LE)

CONCLUSION

From the previous data, it could be concluded that, rations (A), (B) and (C) can cover the nutritional requirements of ewes during gestation period. Also, rations (A) and (B) recorded the best values of milk as quantity and quality during suckling period and the same rations showed the best growth performance of lambs. Therefore it is possible to economically replace berssem hay by spent wheat straw in sheep rations. This would help to decrease pollution in the environment. Also, it is possible to decrease concentrates in sheep rations by using spent wheat straw.

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تأثير التغذية بمخلفات زراعة عيش الغراب على أداء النعاج خلال فترة الحمل والرضاعة

رأفت إبراهيم معوض
معهد بحوث الإنتاج الحيواني – مركز البحوث الزراعية – وزارة الزراعة – مصر.

أجريت هذه الدراسة بمحطة بحوث الجميزة التابعة لمعهد بحوث الإنتاج الحيواني وذلك بهدف دراسة تأثير التغذية بمخلفات زراعة عيش الغراب مع مستويات مختلفة من العلف المركز على الأداء الإنتاجي للنعاج خلال فترة الحمل الأولى والثانية وكذلك أثناء فترة الرضاعة للحملان.
استخدمت في هذه الدراسة عدد ٢٤ نعجة حامل خليط (سوفلك × أوسيمي) بمتوسط وزن ٦٣ كجم وتم تقسيم النعاج إلى ٤ مجموعات متماثلة كل مجموعة ٦ نعاج ووزعت هذه المجموعات بطريقة عشوائية على المعاملات الغذائية التالية :
العليقة (أ) : ٧٠% مركبات مهضومة كلية من احتياجات النعاج من العلف المركز + دريس مضاف إليه ١٠% مولاس للشبع.
العليقة (ب) : ٧٠% مركبات مهضومة كلية من احتياجات النعاج من العلف المركز + مخلفات زراعة عيش الغراب مضاف إليه ١٠% مولاس للشبع.
العليقة (ج) : ٦٠% مركبات مهضومة كلية من احتياجات النعاج من العلف المركز + مخلفات زراعة عيش الغراب مضاف إليه ١٠% مولاس للشبع.
العليقة (د) : ٥٠% مركبات مهضومة كلية من احتياجات النعاج من العلف المركز + مخلفات زراعة عيش الغراب مضاف إليه ١٠% مولاس للشبع.
واستمرت التجربة ٢٠٣ يوم وتم إجراء ١٢ تجربة هضم على النعاج وكانت أهم النتائج المتحصل عليها :
١- بإضافة مخلفات زراعة عيش الغراب في علائق الأغنام تقل المادة الجافة المأكولة ومعظم معاملات هضم المركبات الغذائية المختلفة والقيم الغذائية أثناء فترة الحمل والرضاعة.
٢- أمكن تغطية احتياجات الأغنام باستخدام مخلفات زراعة عيش الغراب في العليقتين (ب) و (ج) خلال فترة الحمل والعليقة (ب) فقط خلال فترة الرضاعة.
٣- زادت كمية اللبن المنتج أسبوعيا بدرجة معنوية للنعاج المغذاه على العليقتين (أ) و (ب) عن العليقتين (ج) و (د).
٤- ارتفعت نسبة المواد الصلبة الكلية والمواد الصلبة الغير دهنية والبروتين في لبن النعاج المغذاه على العليقتين (أ) و (ب).
٥- تحسن معدل النمو اليومي للحملان أثناء الرضاعة والوزن عند الفطام وقل معدل النفوق للحملان وذلك بالنسبة للنعاج المغذاه على العليقتين (أ) و (ب)
٦- استخدام مخلفات زراعة عيش الغراب في تغذية النعاج بمعدلات مختلفة أدى إلى انخفاض تكلفة الغذاء.
وتوضح هذه الدراسة أن استخدام مخلفات زراعة عيش الغراب للشبع في تغذية النعاج مع مستويات مختلفة من العلف المركز ٧٠ ، ٦٠% من الاحتياجات خلال فترة الحمل و ٧٠% من الاحتياجات خلال فترة الرضاعة ، يحسن من مظاهر الأداء بالنسبة للنعاج والحملان حتى الفطام ويقلل تكلفة الغذاء وتلوث البيئة.