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THE EFFECTS OF SINGLE CELL PROTEIN ON AL-AWASSI LAMBS IN IRAQ

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SUMMARY

The effects of single cell protein (SCP) were studied in Al-Awassi lambs in Iraq. Four groups of lambs received 0%, 5%, 10% and 15% of (SCP) as a replacer for a soybean. The influence of (SCP) on the performance and carcass data of lambs and their blood pictures were studied. The total uric acid, blood urea and the histopathological changes were also investigated.

The results showed that there were no significant ($P>0.05$) differences among the initial, slaughtered, total weights gained and chilled carcass weights. The wholesale cuts showed no significant ($P>0.05$) differences. The eye rib area, fat thickness of longissmus doris muscle, average percentage of organs and offal dressing percentage (calculated in live and empty body weight basis) were similar in all groups examined. the blood and serum parameters did not differ significantly ($P>0.05$) among the experimental groups.

INTRODUCTION

Protein defficiency is considered to be one of the major nutritional problems in the world. Therefore, it is imperative that new sources of protein should be developed. In order to meet this requirement many scientists have turned to use nonprotein nitrogenous substances such as urea or ammonium sulphate and single cell protein.

The single cell protein which is produced from yeasts, bacteria and molds (Litchfield, 1983) represent one of the means by which it is possible to eliminate the shortage of proteins in the third world in order to ensure nutritional stability for a rapidly growing population (Tucker *et al.*, 1973).

The use of single cell protein as a protein supplement for ruminants could create a new protein sources that should be less expensive than conventional sources.

The objectives of this work are to study the effects of various levels of ethanol yeast in the ration on the performance and fattening of Al-Awassi lambs.

MATERIALS AND METHODS

Animals and Housing

Twenty four Awassi lambs (3-4 months old, average weight was 27.09 - 2.64 Kg) were divided randomly into four groups, each group consisted of six lambs. The animals were held in pens of an experimental house at the school of veterinary medicine, Al-Ameria, Baghdad. All animals were vaccinated against round warm and were kept in a parasite-free condition.

Feed

Feed was offered on an individual basis. The ration consisted of a concentrate mixture and wheat straw. Concentrate mixture was adjusted during the fattening trial to about 3% of average live weight (National Research Council). The groups received 0%, 5%, 10% and 15% of (SCP) as a replacing for soybean (Table. 2).

Carcass studies

The lambs were fattened for certain periods which were 30, 60 and 90 days. At the end of each trial, two animals from each group were slaughtered. The animals were fastened for 24 hours before slaughtering.

Finishing weight, empty body weight and the weight of various offals and organs were recorded after slaughtering and dressing. Empty body weigh was obtained by subtracting the weight of digestive tract contents. From the live body weight according to the method of Everitt and Jurry (1966). All carcasses were chilled in a cold room for 24 hours at 5°C (Crouse *et al* ., 1981 and Sents *et al.*, 1982) and subsequently dissected into wholesale cuts as described by Orts (1962). The carcass measurements were made according to the methods of Orts (1962).

The area of the longissimus doris muscle was measured in cross section between the 12th and 13th ribs (Henderson *et al.*, 1966). While the physical components of the 9th, 10th and 11th rib cuts, shin, leg and top pieces were determined.

Blood samples were taken from each animal twice a week and the content of urea, uric acid and blood picture were determined by using analyzer (cl-12; Shimbzo, Japan

Table 1. Comonent of the concentrate mixture SCP (Ethanol yeast) Techno-Export czechoslovakia

Ingridient	Ethanol Yeast %			
	ration 1 0%	ration 2 5%	ration 3 10%	ration 4 15%
corn	25	25	25	25
barly	25	25	25	25
wheatbrean	30	30	30	30
soy bean	15	10	5	0
Ethanol yeast (SCP)	0	5	10	15
limestone	2	2	2	2
common salt	1	1	1	1
vitamins	2	2	2	2

Table 2. Chemical composition of the concentrate mixture by using different proportion of (SCP) calculated on dry basis

Components of dry matter	Simple cell protein %				
	0%	5%	10%	15%	cells
Dry matter	91.50	91.00	91.50	91.40	92.70
Organic matter	85.60	85.00	85.60	84.90	85.20
Moisture	8.50	9.00	9.10	8.60	7.30
Crude fat	2.00	2.30	1.60	1.50	0.28
Cru fiber	3.00	3.20	2.80	2.80	0.00
Nitrogen free extract (N.F.E)	65.50	63.58	66.50	65.78	33.92
Ash	5.90	6.70	5.10	7.20	7.50

and autoanalyzer, SMA 12160; Technicon Instrument Co. USA).

Analytical Methods

Analysis of feed stuffs for moisture, ether extract, crude protein, crude fiber and ash were carried out according to the official method of analysis (A.O.A.C., 1970), (Table 1).

Statistical Analysis

Statistical analysis of the results were carried out according to Steel and Torrie (1970) by using the complete randomized design (CRD) and the less significant difference (LSD) for multiple comparisons.

RESULTS

The results of this experiment showed that there were no significant differences ($P>0.05$) among the initial, slaughtered total weight gain and the chilled carcass weight after the three internal (Table 3).

The whole sale cuts showed no significant differences ($P>0.05$) while the necks, the racks and the breast cuts showed a clear significant difference ($P>0.05$) in the first and third months of the experiment (Table 4).

The eye rib area, fat thickness of longissmus doris muscle, the average percentage of organs and offal, the dressing percentage were similar in all groups examined (Table 5). the physical composition of different joints was not affected by treatments.

High nucleic acid count of the SCP did not affect the level of urea and uric acid in the blood of all the experimental lambs.

Histopathological examination revealed slight interstitial and subpleural emphysema of the lungs of lambs in the fourth group only. The Globule leukocytes were detected in their bronchial epithelial mucosa as well as in their intestinal mucosa which were infiltrated with easinophils and lymphocytes also (Fig.1 and 2). While lambs of other groups did not show such changes.

DISCUSSION

The present work aims to estimate the effect and efficiency of SCP (ethanol yeast) utilization in ruminant feeding. The results of this experiment showed that there were no significant difference (P>0.05) among the initial, slaughtered, total gain in weight and chilled carcass weight. The result were similar to those obtained by Klopfenstein (1978) and Nath *et al.*, (1979). This is due to the evidence that ruminants are less dependent on the quality and quantity of dietary protein than non ruminants due to ability of the microflora to produce microbial protein (Nikolic *et al.*, 1971 and Waymack, 1976).

The wholescale cuts showed no significant difference (P>0.05) while the necks, racks and the breast cuts showed a clear significant differenoes (P>0.05) in the first and third month of the experiment. The eye rib area, fet thickness of longissmus doris muscle, average percentage were similar in all groups examined (Alwash and Al-Dafaee, 1985 Mure *et al.*, 1981).

The blood and serum parameters showed no significant differences (P>0.05) among the most groups of animals. This is probably due to the fact that the ruminant can utilize different sources of proteins as a substitute for a dietary protein sources (Briggs, 1967; Pilgrim *et al.*, 1970 and Waymack, 1976).

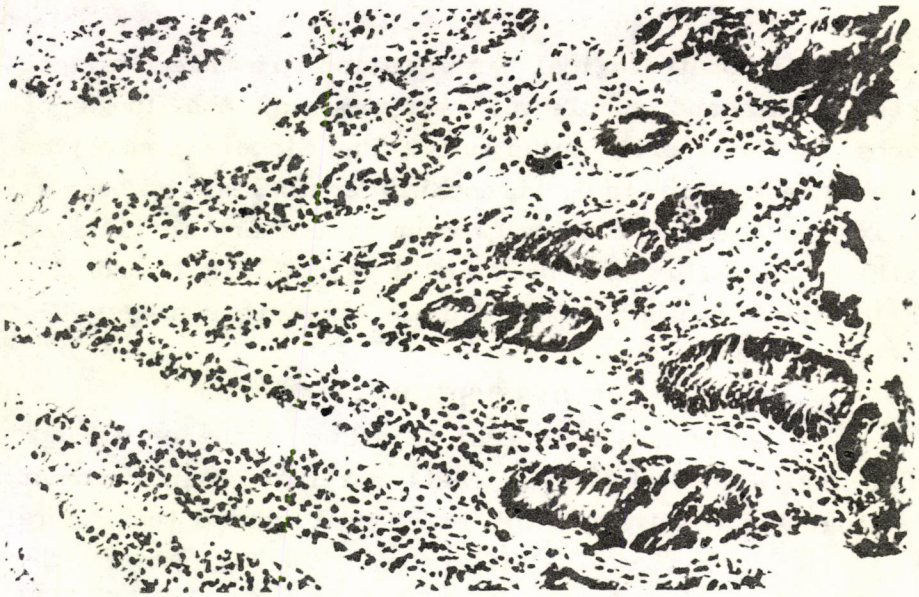


Figure 1: The globule leukocytes and eosinophile infiltrating the intestinal mucosa of a lamb in the fourth group. HCE x 120.

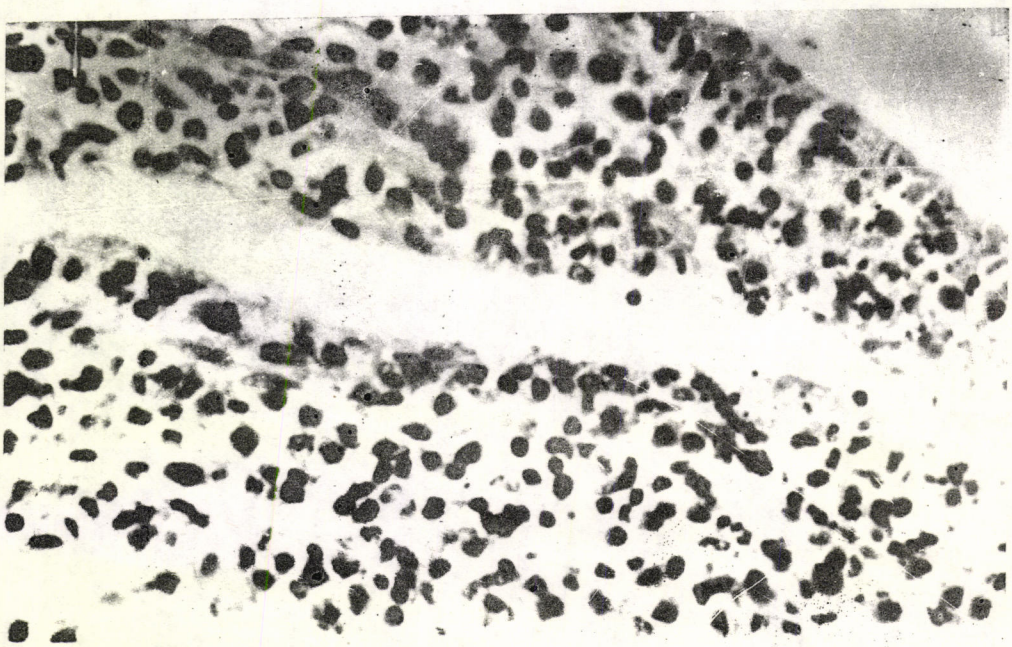


Figure 2: The above picture with higher magnification.

Table 3. Performance of lambs receiving different proportion of (SCP) during the experiment.

Weight	Group	First month	Second month	Third month
Initial weigh (kg)	SCP%0	23.25	28.00	28.75
	SCP%5	29.75	28.00	25.00
	SCP%10	27.25	25.50	25.25
	SCP%15	28.00	28.00	28.25
	L.S.D	N.S	N.S	N.S
Final weight (Kg)	SCP%0	26.00	39.50	40.75
	SCP%5	33.50	35.25	38.28
	SCP%10	30.75	33.00	39.00
	SCP%15	31.25	36.25	41.25
	L.S.D	N.S	N.S	N.S
Total weight gain (Kg)	SCP%0	2.75	11.50	12.00
	SCP%5	3.75	7.25	13.25
	SCP%10	3.50	7.75	13.75
	SCP%15	3.25	8.25	13.00
	L.S.D	N.S	N.S	N.S
Empty body weight(Kg)	SCP%0	22.37	34.85	36.80
	SCP%5	28.97	31.00	35.22
	SCP%10	27.04	29.65	34.87
	SCP%15	26.57	32.21	37.27
	L.S.D	N.S	N.S	N.S
Carcass weight prior to chi-ling (Kg)	SCP%0	12.22	19.29	20.60
	SCP%5	15.62	17.27	18.89
	SCP%10	14.16	16.45	19.55
	SCP%15	14.29	18.15	19.60
	L.S.D	N.S	N.S	N.S

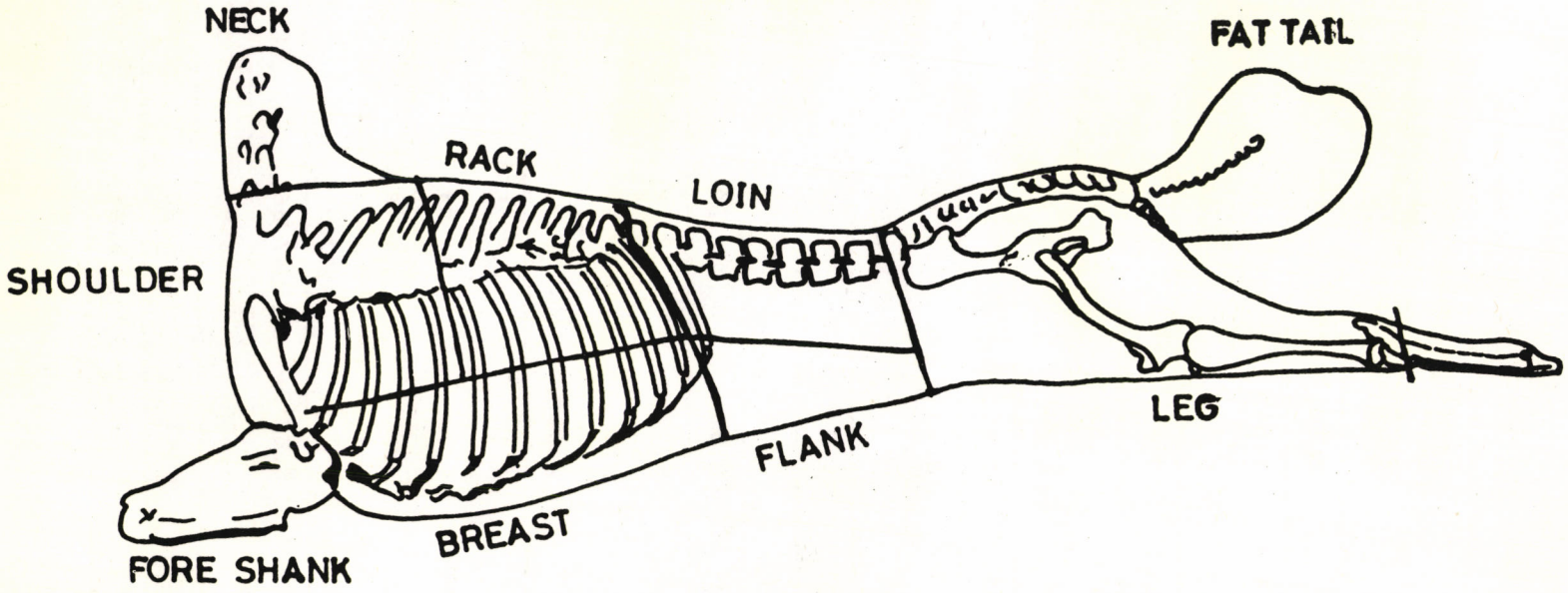
	SCP%0	12.04	18.77	20.39
	SCP%5	15.41	16.82	18.50
Carcass weight after chilling (Kg)	SCP%10	13.96	16.10	19.40
	SCP%15	13.80	17.97	19.35
	L.S.D	N.S	N.S	N.S
	SCP%0	8.68	9.99	3.31
	SCP%5	8.10	8.19	11.34
Rib-eye area cm^2	SCP%10	8.99	9.68	10.49
	SCP%15	7.87	10.15	12.87
	L.S.D*	N.S**	N.S	N.S
	SCP%0	3.00	3.20	3.30
	SCP%5	3.80	3.90	5.30
Fat thickness mm	SCP%10	2.87	4.20	3.20
	SCP%15	2.85	4.00	2.90
	L.S.D	N.S	N.S	N.S
Dressing percentage calculated on live weight	SCP%0	45.84	47.64	49.92
	SCP%5	46.00	47.74	48.51
	SCP%10	45.39	48.47	49.72
	SCP%15	44.16	49.56	47.03
	L.S.D	N.S	N.S	N.S
Dressing percentage calculated on empty body weight	SCP%0	53.61	53.93	55.28
	SCP%5	53.11	54.28	52.71
	SCP%10	51.61	54.47	55.62
	SCP%15	51.93	55.78	52.02
	L.S.D	N.S	N.S	N.S

LSD: Less significant differences

N.S. Non significant

Table 4. Carcass trials of lambs fattened on the experimental rations

Item	Group	First month	Second month	Third month
Neck	SCP%0	5.36[a]	5.45	5.22
	SCP%5	5.52[a]	4.77	3.58
	SCO%10	4.55[b]	5.20	4.42
	SCP%15	5.08[a]	5.44	5.77
	L.S.D	0.48	N.S	N.S
Shoulder	SCC%0	19.32	15.73	17.51
	SCP%5	20.69	14.55	15.53
	SCP%10	17.67	14.41	16.75
	SCP%15	18.58	14.45	17.60
	L.S.D	N.S	N.S	N.S
Ribs	SCP%0	11.34	7.88	7.59[bc]
	SCP%5	9.99	7.69	9.85[a]
	SCP%10	8.92	9.80	7.31[c]
	SCP%15	9.42	9.99	8.16[ab]
	L.S.D	N.S	N.S	0.93
Forelegs	SCP%0	5.55	5.31	4.25
	SCP%5	4.15	6.25	7.34
	SCP%10	4.91	4.81	5.74
	SCP%15	5.16	5.26	6.21
	L.S.D	N.S	N.S	N.S
Breast	SCP%0	6.67	7.66	6.83[d]
	SCP%5	6.48	8.92	8.10[a]
	SCP%10	6.42	6.66	7.28[c]
	SCP%15	6.21	9.84	7.76[b]
	L.S.D	N.S	N.S	0.43



مخطط رقم (١) القطع الرئيسية لذبائح الحملان

Table 5. Average weight of certain body parts, organs and offals as a percentage of empty body weight

Item	Group	First month	Second month	Third month
Head	SCP%0	6.99	7.17	7.06
	SCP%5	6.75	7.41	6.43
	SCP%10	5.26	6.97	7.39
	SCP%15	7.53	7.04	6.90
	L.S.D	N.S	N.S	N.S
Faat	SCP%0	3.89	3.11	3.16
	SCP%5	3.06	3.46	2.98
	SCP%10	3.14	3.02	3.31
	SCP%15	3.29	3.06	3.12
	L.S.D	N.S	N.S	N.S
Lungs	SCP%0	1.74	1.47	1.29
	SCP%5	1.52	1.29	1.18
	SCP%10	1.28	1.32	1.41
	SCP%15	1.31	1.41	1.43
	L.S.D	N.S	N.S	N.S
Spleen	SCP%0	0.55	0.32	0.16
	SCP%5	0.39	0.28	0.24
	SCP%10	0.41	0.43	0.30
	SCP%15	0.31	0.23	0.25
	L.S.D	N.S	N.S	N.S
Liver	SCP%0	2.05	2.01	1.43
	SCP%5	2.09	1.85	1.40
	SCP%10	1.93	1.69	1.62
	SCP%15	1.85	1.94	1.66
	L.S.D	N.S	N.S	N.S
Heart	SCP%0	0.46	0.43	0.40
	SCP%5	0.43	0.36	0.34
	SCP%10	0.41	0.33	0.40
	SCP%15	0.52	0.34	0.39
	L.S.D	N.S	N.S	N.S

	SCP%0	0.39	0.28	0.26
	SCP%5	0.26	0.32	0.27
Kidneys	SCP%10	0.37	0.33	0.29
	SCP%15	0.37	0.31	0.28
	L.S.D	N.S	N.S	N.S
	SCP%0	0.32	0.56	0.85
	SCP%5	0.34	0.66	0.68
Testes	SCP%10	0.29	0.66	0.53
	SCP%15	0.56	0.58	1.02
	L.S.D	N.S	N.S	N.S
	SCP%0	0.31	0.18	0.41
	SCP%5	0.38	1.08	1.01
Kidney	SCP%10	0.27	0.29	0.36
	SCP%15	0.28	0.33	0.44
	L.S.D	N.S	N.S	N.S
	SCP%0	0.39	0.50	1.50
	SCP%5	0.76	0.84	1.96
Abdomina	SCP%10	0.40	0.76	0.56
Fat	SCP%15	0.56	1.08	0.84
	L.S.D	N.S	N.S	N.S
	SCP%0	8.49	8.62	7.19
	SCP%5	9.31	8.06	7.78
Empty	SCP%10	9.73	7.94	8.74
diges-	SCP%15	8.47	9.00	7.41
tive Tract	L.S.D	N.S	N.S	N.S

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تأثير بروتين احادي الخلية على الاغنام العواسي في العراق

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الخلاصة

تم دراسة تأثير بروتين احادي الخلية على الاغنام العواسية، اجريت هذه الدراسة على اربع مجاميع من الاغنام تمت تغذيتها بالنسب الاستبدالية لبروتين احادي الخلية هي صفر، ٥٪، ١٠٪ و ١٥٪ مع كسبة فول الصويا.

تم دراسة صفات الذبيحة، التغيرات الدموية والتغيرات النسيجية التي قد يحدثها بروتين احادي الخلية.

كانت النتائج تشير الى عدم وجود فروق معنوية في معدلات الوزن الابتدائي والوزن النهائي، والزيادة الوزنية ووزن الذبيحة قبل وبعد التبريد.

لم يلاحظ فروقات معنوية في معدلات النسب المئوية لقطع الذبيحة ولا في مساحة العضلة العينية وسمك الطبقة الدهنية.