EFFECT OF CORIANDER AND ANISE AS FEED ADDITIVES ON GROWTH AND CARCASS CHARACTERISTICS OF FATTENING BUFFALO CALVES.

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SUMMARY

Twenty-one six months old male buffalo calves weighed in average 110 kg were randomly divided into three groups (7animals each). Animals in group 1 (GR_1) fed non-experimental ration (control), while animals in group2 (GR_2) and group3 (GR_3) were fed rations with 4 kg /ton of concentrate feed coriander or anise as feed additives, respectively. Three animals of each group were slaughtered at the end of the feeding trial which lasted 240 days. The results showed that live body weight of calves in $GR_1$was insignificantly higher than that of animals in GR_2 and GR_3. Dry matter intake of calves fed rations supplemented with coriander and anise were insignificantly higher than that of control group. The dressing percentage calculated relative either to slaughter weight (SW) or empty body weight (EBW) was higher for calves in GR_2 than other groups. In similar trend meat yield percentage relative to SW or HCW had the highest values for calves in GR_2. Meat of calves in GR_2 had higher juiciness, aroma and palatability in comparison to those of GR1 and GR_3. Cooking loss was higher for meat of calves in GR_1 than of GR_2 and GR_3. It was obvious that, feeding coriander supplement improved the boneless meat (BM) / slaughter weight (SW), boneless meat BM / hot carcass weight (HCW), meat: bone ratio, water holding capacity, tenderness and eye muscle area than control group (GR_1) .It is fair to recommend the coriander as a natural supplement at 4kg / ton concentrate feed to improve meat yield and meat quality of buffalo calves.

Keywords: *buffalo calves, coriander, anise, body weight, carcass characteristics.*

INTRODUCTION

The most important factor affecting animal production is the gap between feed requirements of animals and the available amounts of feed all-over the year. The main reason of this problem is the great competition between human demands and animal requirements on a limited cultivated area and inadequate food crops to cover their nutritional needs. This situation resulted in a serious problem especially in summer season due to the shortage of green fodder needed to cover animal feed requirements.

Buffaloes are considered economic breeds in meat and milk production. The production of red meat from buffalo accounts more than 35%, of the total meat production in Egypt. Buffaloes have ability to convert roughages to high fat milk, and meat exceptional leanness meat with an average increase in live weight of 0.90 kg/day (Fooda, 1996)

Feed additives are used to improve animal growth and production performance. Some of these (chemicals, propiotics, antibiotics, hormones ....etc) .They have favorable effect on the internal environment of animal and its production performance. On the other hand, these additives might have unfavorable and unsafe side effects for human who are consuming the products of such animals (Salem and El Mahdy, 2001).In this concern, the European Union Legislation banned use of antibiotics in animal feeds in January of 2006. For this reason, industry is searching for alternative additives such as plant extracts that are generally recognized as safe for human and animal consumption. Moreover, there are more attempts have been done toward using medical herbal plants as natural compounds that can improve the animal production without threaten the human health.

Using medical herbal plant as feed additives in animal ration were noted to improve digestion and feed efficiency (El-Ekhnawy *et al.,* 1999 and Salem and El-Mahdy, 2001). Cardozo *et al.(* 2006) reported that anise oil and capsicum oil are useful as modifiers for rumen fermentation of beef cattle .

The whole seed of coriander (*Coriandrum sativum*) and anis (*Pimpinell anisum*) are traditionally used as flavoring agents for spicy products and as medical treatment for human in Egypt. The coriander oils consists mainly of linalool(50 to 60 %) and about 20% terpenes and anise seeds contain a number of compounds including anethol (approximately 90%) ,gamma-himachalene,estradole and myrcene (Rohr *et al.,* 1990 and Guypto *et al.,* 1996).

The present work aimed to investigate the effect of adding coriander or anise to traditional rations of buffalo male calves to investigate its effect on carcass characteristics and meat quality.

MATERIALS AND METHODS

The experimental work was carried out at Seds Village experimental station, Beni Sweif Governorate belonging to Animal Production Research Institute (APRI), Agriculture Research Center, Egypt.

Animals and management:

Twenty- one buffalo male calves at 6 months of age and around 110 kg live body weights were used. The animals were randomly divided into three groups (7 animals each). They were housed under semi-open sheds, partially roofed with asbestos corigated sheets throughout the experimental period (240 days), the animals in the second (GR_2) and third (GR_3)groups were fed ration supplemented with coriander and anise, respectively. The first group (GR_1) was fed the same ration without supplements (control).

Coriander and anise were added at 0.04 % /of the concentrate fed mixture according to Abo-Donia *et al.*,2003. Ration was offered according to A.P.R.I.(1997) allowances for growing calves twice daily. Rice straw and berseem hay (*Trifolium alexandrinum*) were offered *ad libitum* for all groups throughout the experimental period (240 days). The concentrate feed mixture (CFM) composed of; 30% undecorticated cotton seed meal, 35% wheat bran, 16% yellow corn, 10% rice bran, 5% vinas, 3% limestone and 1% common salt. The chemical compositions (CP: crude protein, CF: crude fiber, EE: ether extract, NFE: nitrogen free extract) of the experimental rations (on dry matter basis) are shown in Table (1).

Table (1): Chemical composition of experimental feeds.

Item	DM%	DM composition, %				
		CP	CF	EE	NFE	Ash
Concentrate feed mixture	86.94	13.50	11.90	2.40	62.70	9.50
Rice straw	89.69	3.35	43.53	1.13	39.42	12.57
Berseem hay	88.61	13.00	29.10	1.30	46.50	10.10

Carcass characteristics:

At the end of fattening period, three calves from each group were randomly chosen and fasted for 16 hours and then slaughtered. After complete bleeding, the animals were skinned and dressed out. Weights of carcass offals (liver, heart, kidneys and spleen) and non-carcass components (head, hide, four legs, lung and empty digestive tract with abdominal fat), were recorded. Each carcass was split into two halves, each half was subdivided into fore and hind quarter. Cut of the best ribs (9, 10 and 11^{th}) was separated and weighed. Each quarter and best ribs of hot carcasses were dissected into bone and boneless meat and each were separately weighed. Dressing percentage was calculated as the following formula (hot carcass weight) / slaughter weight), meat yield, fat of the digestive tract, kidneys and heart and coefficient of meat were estimated and recorded. Samples of meat from longissimus dorsi muscle (eye muscle) of the same ribs were used to determine eye muscle area (by planometer) and physical analysis (pH value, water holding capacity, tenderness, cooking loss % and color intensity). Tenderness was determined according to Soloviev (1966). All chemical analysis of feeds and meat were carried out according to A.O.A.C. methods (1996).

Data were subjected to statistical analysis using the general linear model of SAS (1998). The differences among means were tasted using Duncan's multiple range test (Duncan, 1955).

Net revenue:

The method of calculating net revenue is the "gross margin" method as the following formula: Gross margin = (total return amount × price) – variable costs.

RESULTS AND DISCUSSION

Animal's growth performance:

Mean values of daily gain (DG) of animals fed different supplements are shown in Table (2). Daily gain of calves in GR_1 and GR_2 was insignificantly higher than GR_3. Ali *et al.* (2005) and Mohamed *et al.* (2005) found significant ($P<0.05$) improvement in average daily gain of lambs fed rations supplemented with medicinal herbs.

Daily dry matter intake of calves fed rations supplemented with coriander and anise was insignificantly higher than that of control group. These results were in accordance with Khir and Ibrahim (2007), on buffalo calves who reported that dry matter intake was not affected by addition of coriander or anise to the ration. While, Warwrrzymezak *et al.* (2000) reported that there was a tendency for calves to increase the DM intake of concentrates or forages supplemented with medicinal herbs.

Supplementation of coriander and anise to the diet did not improve the fed efficiency of buffalo calves. This result was not in agreement with those reported by Guypto *et al.* (2005) and Ali *et al.* (2005), who reported that feed conversion efficiency for groups fed rations contained medical herbs was better than control group. The improvement of feed conversion associated feeding medical herbs was noted to be due to increase in bacterial and protozoal population and activity (McDonald *et al.*, 2002). Guypto *et al.* (2005) found also that supplementation of a mixture of herbs fed as feed additive had beneficial effect on growth of crossbred heifers. They noted that the better feed efficiency might be due to the higher utilization of metabolizable energy available for growth.

Table (2): Mean daily feed intake, growth rate and feed efficiency of buffalo calves fed rations supplemented without or with coriander and anise.

Item	Experimental groups		
	GR_1	GR_2	GR_3
No. of animals	7	7	7
Experimental period (day)	240	240	240
Average daily feed intake as fed (kg):			
CFM*	5.02	5.27	5.08
Rice straw	1.24	1.21	1.19
Berseem hay	1.14	1.21	1.19
Coriander	0	0.025	0
Anise	0	0	0.025
Initial weight (kg)	109.5	107.4	107.4
Final weight (kg)	410.0	399.8	386.0
Mean daily gain (kg)	1.25	1.22	1.16
Mean daily feed intake, DM (kg/h)	6.48	6.73	6.54
Feed efficiency, (kg gain/kg DM)	0.19	0.18	0.18

**CFM: concentrate feed mixture*

Carcass traits and meat quality:

Data presented in Table (3) showed that the weight of buffalo calves in group 1(GR_1) was significantly ($P<0.05$) higher than those supplemented with coriander (GR_2) or anise (GR_3) by 2.6 and 6.2%, respectively. Hot carcass weight (HCW) was significantly ($P<0.05$) higher for buffalo calves fed coriander (GR2) or without (GR_1) than GR_3. These results are in agreement with those obtained by Zeidan, *et al.* (2003).

Table (3): Carcass characteristics of buffalo's calves fed ration supplemented without or with coriander or anise.

Item	Experimental groups		
	GR1	GR_2	GR_3
Slaughter weight, kg (SW)	410.0±8.66 [a]	399.8±9.91 [b]	386.0±29.74 [c]
Empty body weight, kg (EBW)	365.6±4.60 [a]	364.3±13.17 [b]	338.8±24.78 [c]
Hot carcass weight, kg (HCW)	234.1±6.17	235.6±4.44	215.7±5.10
Boneless meat weight, kg (MW)	197.3±2.50[b]	202.9±1.07[a]	179.6±2.55[c]
Edible offals weight, kg :			
Liver	6.2	6.5	5.0
Heart	2.1	2.6	1.6
Defatted kidneys	2.5	2.5	2.1
Spleen	1.1	1.4	1.3
Total	11.9	13.0	10.0
Non- edible offals weight, kg :			
Head	26.7	25.3	24.3
Legs	12.5	11.5	12.5
Lungs and trachea	7.9	7.2	6.3
Empty GI tract	22.1	21.9	22.1
Total	69.2	65.9	65.2
Trimmings, kg :			
Blood	5.5	6.0	6.0
Hide with genital organs	47.3	45.7	45
GI tract content	44.4	35.5	47.2
Bone	36.8	32.7	36.1
Total	134.0	119.9	134.3
Knife separable fat, kg :			
Abdomen	1.7	2.5	1.9
Kidneys	1.4	1.6	1.1
Total	3.1	4.1	3 .0

a, b and c: values with different superscripts within the same row, are statistically different ($P<0.05$).

However, total edible offals weight (OFW) was slightly higher in calves treated with coriander (GR_2) than anise (GR3) or control group (GR1). The highest average edible offals weight was recorded for calves of GR_2 group. The boneless meat and meat /bone ratio for calves of GR_2 were significantly ($P<0.05$) higher than GR_1 and GR_3(Table 3,4).

Similar trend was reported by El-Basiony *et al.* (2001) and Zeidan, *et al.* (2003) on buffalo calves. The highest weights of liver, heart, kidneys and spleen were recorded for calves in GR_1 and GR_2 then GR_3. These results may be attributed to the high fat content of these organs (Table 3). Similar trend was observed by Salem and El-Mahdy (2001) and Salem *et al.* (2004)

The total average weight of non edible offals of calves in GR_1 and GR_2 was insignificantly higher compared to that of GR_3 (Table 3).

Dressing percentage:

The dressing percentage expressed as hot carcass weight (HCW) relative to slaughter weight (SW) (DP_1) showed insignificant increase for calves in GR_2 than GR_1 or GR3 (58.92 *vs.* 57.09 and 55.88), respectively (Table 4).

Table (4): Dressing and boneless meat percentages for slaughtered calves in different experimental groups.

Item	Experimental groups		
	GR_1	GR_2	GR3
Dressing percentage (DP)			
HCW/SW% (DP_1)	57.09±2.1	58.92±0.3	55.88±2.5
HCW/EBW% (DP_2)	64.03±2.2	64.67±1.3	63.67±3.6
Boneless meat percentage (BMP):			
BM/SW % (BMP_1)	48.12±o.9	50.76±0.3	46.54±0.9
BM/HCW % (BMP_2)	84.28±0.9	86.13±0.8	83.28±0.6
BM/bone %	5.36	6.21	4.98

HCW: hot carcass weight , SW: slaughter weight, EBW: empty body weight, BM: boneless meat.

Boneless meat percentage (BMP):

Boneless meat weight and boneless meat percentage relative to slaughter weight (BMP_1) or hot carcass weight (BMP_2) showed insignificant increase with calves in GR_2 than those of GR_1 and GR_3 (50.76 *vs.* 48.12 and 46.54%) for BMP_1 and (86.13 *vs.* 84.28 and 83.28%) for BMP_2, respectively.

These results with coriander seeds supplement could be due to essential oil and linalool. Cabuk *et al.*,2003 and Guypto *et al.*,2005 reported that linalool has an appetizing effect in diets and stimulates the digestive process in animals.

Meat quality:

The quality of meat depends on physical properties and chemical characteristics of meat (Sharma, 1988).

Table (5) shows that moisture and protein percentages in longissimus dorsi muscle were insignificantly higher in GR_2 than GR_3 and GR_1. While, fat percentage was insignificantly higher for calves in GR_3 compared to GR_1 and GR_2 (5.2 *vs.* 4.7 and 4.4%), respectively. Ash percentage was insignificantly higher for calves in GR_1 than GR_2 and

GR_3 (1.3 vs 0.5 and 0.4 %, respectively).Similar trends were reported by Zeidan (1998) and Zeidan, *et al.* (1999) and El-Kholy *et al.* (1999).

Salem *et al.* (1982) found that moisture, protein, fat, and ash contents of buffalo calves meat were 77.4, 20.53, 1.12and 8.5%, respectively. These values were lower than those obtained by Fahmy (1986) on buffalo calves.

Table (5): Chemical analysis of longissmus dorsi muscle of buffalo calves fed traditional ration supplemented with or without coriander and anise.

Item	Experimental groups		
	GR1	GR_2	GR_3
Moisture (%)	69.50±0.92	69.90±0.86	69.80±0.57
Protein (%)	23.50±0.03	24.10±0.03	23.40±0.04
Fat (%)	4.40±0.39	4.70±0.74	5.20±0.54
Ash (%)	1.30±0.02	0.50±0.01	0.40±0.01

Physical properties of meat:

The pH values for meat with the different experimental calves were insignificantly different (Table 6).

Table (6): Physical characteristics of longissmus dorsi muscle of buffalo calves fed traditional ration supplemented without or with coriander or anise.

Item	Experimental groups		
	GR_1	GR_2	GR_3
The pH value	5.5	5.4	5.6
Water holding capacity (cm^2)	7.50±1.6	6.70±0.9	8.40±0.8
Tenderness (cm^2)	6.50±0.9	5.50±0.7	7.60±1.7
Cooking loss (%)	$39.40±1.35^a$	$37.30±3.5^a$	$38.20±3.1^b$
Color intensity (unit)	0.23±0.04	0.23±0.3	0.23±0.06
Eye muscle area (cm^2)	$75.20±2.62^b$	$98.60±3.02^a$	$72.43±5.6^b$

a, b and c: values with different superscripts within the same row, are statistically different ($P<0.05$).

The pH values obtained for meat in different experimental groups were between 5.4 to 5.6 with no significant difference among groups. The normal pH of fresh meat is tended to be acidic due to the break down of glycogen to lactic acid during the rigor mortis (El Hosseiny *et al.*,2000).The results of the present study were in agreement with the results recorded by many authors (Anijanevulu *et al.*,1985; Soliman,1987 ; Awad, 1996; Zeidan, *et al.*, 1999; Salem *et al.*,2004 and Abd El Hady *et al.*,2006)

The obtained results in Table (6) indicated that meat of the eye muscle was bright in colour for different experimental calves and no significant difference was found between groups. Similar results were reported by Hall *et al.* (1944), El Asheeri (1984) and Zeidan, *et al.* (1999).

The bright red is preferred by most meat customers because it denotes freshness, hence it is a good quality indicator to them. It is well known that young animals have less pigment in their meat and therefore, the lower color intensity values are noticed for meat of young than older animals. However dark color meat possesses more flavor than the light color meat.

Cooking loss percentage of the longissimus dorsi muscle is presented in Table (6). Data showed that percentage of cooking loss was insignificantly higher with calves in GR_1 and GR_3 than GR_2 (39.4 and 38.2 *vs.* 37.3%). These results are in agreement with those obtained by Zeidan, *et al.* (1999) and Abd El Hady *et al.* (2006).In this regard El - Asheeri, 1984 noted that cooking loss is resulted from the reduction of water binding protein after heat de-naturation.

The area of water holding capacity (WHC) of fresh meat for calves in GR_3 and GR_1 were insignificantly higher (8.4 and 7.5 cm^2) than GR_2 (6.7 cm^2).Similar trends were reported by Fahmy (1986) and Zeidan, *et al.* (2003) in buffalo. There are a positive relationship between protein percentage and expressible fluid. Since proteins are the principal water binding constitutes in meat (Salem, *et al.*, 1982; Fahmy, 1986; Soliman, 1987). The higher of moisture/protein ratio indicated to lower the ability of muscles to retain available water (Sharma, 1988).

Results in Table (6) illustrated that tenderness for fresh meat was insignificantly higher for calves in GR_3 than those in GR_1 and GR_2 (7.6 *vs.* 6.9 and 5.5 cm^2).Tenderness is consider the ability of muscles to water retention and it is the most important factor that affects quality of meat and its palatability. The major component of meat contributing its tenderness is the composition of the muscle cell and its surrounding connective tissue (Forrest *et al.*, 1975 and El Sharkawy, 1984). Udin (1967) reported that the high tenderness of the fresh meat may be attributed to the high content of fat. In addition, Payliaro (1978) found that tenderness of meat depends on collagen quantity, its maturity, and muscle contraction during rigor mortis and resistance of myofibrils proteins. Similar trends were reported by Abd El Hady *et al.* (2006).

Eye muscle area:

Best ribs cut (9^{th}, 10^{th} and 11^{th} ribs) are widely used to predict the lean, fat and bone percent in the whole carcass (to evaluate the carcass composition). Highly significant relationship between separable lean of carcass was associated with the eye muscle area. Eye muscle area was ranged from 72.43±5.6 to 98.6±3.02 cm^2 (Table 6). The highest area was recorded with calves in GR_2 (98.6 cm^2) and the lowest ($P<0.05$)were recorded for calves in GR_3 (72.43 cm^2). These results were in agreement with those recorded by Bedeir *et al.* (1980). These results might lead to suggest that the phytochemical compounds in coriander could have an effective role in building up the muscular tissues of growing animals.

Economical indicators:

Average feed cost/kg weight gain and economic feed efficiency for the experimental rations used during feeding trail are illustrated in Table (7). The lowest values of feed cost/kg weight gain was recorded with calves in GR_1 and GR_2 (4.52 and 4.88 LE, respectively) than GR_3 (5.08 LE). Economical efficiency with the calves in $GR_2$and $GR_1$was better than GR_3. These findings are in agreement with those of Khir and Nany

Ibrahim (2007) who mentioned that adding coriander and anise to the ration increase economical efficiency by 19.01 and 3.96% and decreased feed cost by 15.97 and 3.80%, respectively. Ali *et al.* (2005) and Maged (2004) indicated that adding medicinal herbs to the ration of lambs decreased feed cost and improved the economical efficiency.

Although the final live body weight of the control group was insignificantly higher than that of other groups, the weight of the boneless meat in GR_2 was higher, which gives the ultimate economical value for the producer. It was also found that the coriander resulted in improvement of the physical qualities, which are preferred by the customer such as flavor and tenderness .This study concluded that we could favorably use the coriander as a natural supplement for the enhancement quality of buffalo meat.

In this study , addition of coriander to the ration of growing buffalo calves improved the BM/SW, BM/HCW, meat/bone , water holding capacity, tenderness and eye muscle area.

Table (7): Effect of feeding experimental rations on economical efficiency.

Item	Experimental groups		
	GR1	GR2	GR3
Cost of feed consumed	5.65	5.95	5.89
Price of weight gain	15	14.64	13.92
Feed cost/kg weight gain	4.52	4.88	5.08
Economical efficiency	2.65	2.46	2.36

Based on market price during the experimental period. The price (L.E.) of one kg of CFM, rice straw, berseem hay, anise, coriander and live body weight were: 1.100, 0.060, 0.500, 7.00, 6.00 and 12.00, respectively

REFERENCES

A.O.A.C. (1996). Official Methods of Analytical Chemist. 16th ed., Washington DC.,USA.

A.P.R.I. (1997). Local Allowances for Lactating Buffaloes. Animal Production Research Institute , Ministry of Agriculture, Dokki, Giza, Egypt.

Abd El Hady, M.A.A.; Soheir, M. Zeidan and Hoda, Z. Hassan (2006). Baby beef production from buffalo calves raised on different feeding regimes. J. Agric. Sci., Mansoura Univ., 31(10): 6263-6274.

Abo-Donia, F.M.A.; G.H. Zaza and A.M. Mansour (2003). Effect of using natural non-traditional growth promoters on beef steers performance. The 9th Conf. on Animal Nutrition, Hurghada, 14-17 October, Egyptian, J. of Nutrition and Feeds.

Ali, M.F.; M.S. Saleh; N.M. Ewedah and S.A. Mahmoud (2005). Effect of using chamomile (*Mtricaria chamomilla*) flowers as feed additives on performance of growing lambs under desert farming systems. Egyptian, J. Nutrition and Feeds, 8(2): 121-147.

Anijanevulu, A.S.R.; S.S. Senger; V. Lakshmanan and D.C. Josh (1985). Meat quality of male buffalo calves maintained on different levels of protein. Buffalo Bull., 4: 45-48.

Awad, A.S.S. (1996). The use of growth promoters for cattle and buffaloes. Ph.D. thesis, Faculty of Agriculture, Cairo University, Egypt.

Bedeir, L.H.; F. El-Sabban; I.A. Abu-Selim and H. El-Nouby (1980). Effect of castrating sukling buffalo calves feedlot performance and carcass characteristics. Agric. Res. Rev., 58: 3-7.

Cabuk, M.; A. Alcicek; M. Bozkurt and N. Imre (2003).Antimicrobial properties of the essential oils isolated from aromatic plants and using possibility as alternative feed additives. II. National Animal Nutrition Congress. 18-20 September, Konya, Turkey, 184-187.

Cardozo, P.W.; S. Capsamiglia; A. Ferret and C. Kamel (2006). Effect of alfalfa extract, anise, capsicum and a mixture of cinnamaldehyde and eugenol on ruminal fermentation and protein degradation in beef heifers fed a high concentrate diet. J. Animal Sci., 84: 2801-2808.

Duncan, D.B. (1955). Multiple range test and multiple , F- test. Biometrics, 11: 1–42.

El-Asheeri, A.K.A. (1984). Chemical and physical characteristics of meat. M.Sc. Thesis, Fac. Agric., Cairo University, Egypt.

El-Basiony, A.Z.; H.M. El Sayed; E.E. Ragheb; M.A. El-Ashry and A. Sorour (2001). Effect of pronifer supplementation on the performance of buffalo calves at different stages of growth and fattening. Egypt, J. Nutrition of Feeds, Vol. 4(Special Issue), 641-649.

El-Ekhnawy, Kh. E.; A.M. Otteifa; O.H. Ezjo and M.A. Hegazy (1999). Post weaning reproductive activity of Barki ewes lambing in spring fed Nigella Sativa oil seed meal. Assiut. Vetrinary Medical Journal, 40: 292.

El- Hosseiny, Hoda, M.S.M.; S.M.A. Allam; A.M. Abdel Gawad and A.M.M. Zeid (2000). Medicinal herbs and plants as feed additive for ruminants. 2- Effect of using some medicinal herbs on growth performance of Zaraibi kids. Proc. Conf. Animal Production in the 21st century, Sakha, 18-20 April, 89-99.

El-Kholy, A.F.; M.A.I. Salem; M.A.M. Ibrahim and A.S. Sami (1999). Meat quality of Egyptian buffalo and Friesian males implanted with anabolic agents. Egypt J. Anim. Prod., 36(1): 1-8.

El-Sharkawy, A.M.A. (1984). Chemical and technological studies on meat. M.Sc. Thesis, Fac. Agric., Tanta University, Egypt.

Fahmy, A.A.E.H.M. (1986). Comparative feeding studies with buffalo calves using summer and winter green forages for meat production. Ph.D. thesis, Agric. Fac., Cairo University, Egypt.

Fooda, T.A. (1996). Studies on growth and milk production in Egyptian buffaloes. M.Sc., thesis, Fac. of Agric., Ain Shams University, Egypt.

Forrest, J.C.; E.D. Aberle; H.B. Hedrick; M.D. Judge and R.A. Merkel (1975). Principles of Meat Science,PP:417 W.H. Freeman and Co., San Fransisco, USA.

Guypto, N.; K. K.K. Thahrai; S.K. Arora and M.L. Chowdhary (1996). Structural carbohydrate and minerals contents of fenugreek seeds. Indian, CoCa. Arecemut and Species, Journal, 20: 4-120.

Guypto, N.; A. Kumar and D.P. Tiwar (2005). Effect of herbs as feed additive on nutrient utilization and growth in crossbred heifers fed paddy straw ration. Indian J. Anim. Sci., 75(1): 52-55.

Hall, J.L.; D.L. Machinlosh and Gladys, E. Vuvail (1944). Quality of beef: III. Effect of feeding lime stone supplement on quality of beef. Kansas Agric. Exp. Station Technal. Bulletin, 58.40. (C.F. Proc. Meat Tenderness Symposium by Samden, U.S.A., 161-182, 1963).

Khir, A.A. and Nany, S. Ibrahim (2007). Effect of coriander and anise as feed additives on performance of buffalo calves. Egyptian, J .Nutrition and Feeds (2) (Special Issue)::453-460.

Maged, G.A. (2004). Nutritional studies on smaller ruminants. M.Sc. Thesis, Fac. of Agric., Monsoura University, Egypt.

McDonald, P.; R.A. Edwards; I.E.D. Greenhalgh and C.A. Morgan (2002). Special methods for measuring digestibility. Animal Nutrition, 5th Ed. Copy right Licensing LTD. London, England.

Mohamed, A.H.; Nadia, Abd El-Bar and K. Ibrahim (2005). Influence of some medicinal plants supplementation: 2- Lambs performance, carcass properties and mutton meat quality. Egyptian, J. Nutrition and Feeds, 8(1)(Special Issue): 445-460.

Payliaro, A.F. (1978). Meat tenderness. Bwoviunede Courrier des Abattoirs,19 (106) 29-35.C.F.FASTA,11,249.

Rohr, K.; F.P. Engling; P. Lebzien and H.J. Oslage (1990). Analysis and evaluation of coriander oil meal for ruminant diet. Landbaufo rschung-Volk enrode, 40: 133.

Salem, F.A.' A.A. Abu El-Ella; M. Marghany and H. El Amary (2004). Effect of medical herbs and plants as feed additives on sheep performance. J. Agric Sci., Mansora Univ., 29(5): 2303-2320.

Salem, F.A. and M.R. El Mahdy (2001). Effect of some medicinal plants as feed additives on nutrients digestibility, rumen fermentation, blood and carcass characteristics of sheep. The 2nd Conf. Anim. Prod. And Health in Senai-Arid Area, El-Arish, North Sinai

Salem, M.A.I.; G.A. Darwish; Abd El-Hafiz and M. Nasrat (1982). Growth and meat quality of Friesian and buffalo calves fed on different plants. II. The quality of lean meat. Egyptian J. Anim. Prod., 22: 83-89.

SAS (1998). SAS users guide for personal computers, SAS Institute Inc., Cary, NC., USA.

Sharma, D.D. (1988). Nutritional aspects in relation to meat production from buffaloes. Proc. 2nd World Buff. Cong., 2:475-90. Indian Council of Agricultural Research, New Delhi.

Singh, G.; I.P. Kapoor; S.K. Pandey; U.K. Singh and R.K. Singh. (2002) Studies on essential oils: part 10; antibacterial activity of volatile oils of some spices. Phytother, Res. 16, 680-682.

Zeidan, Soheir, M. (1998). Studies on meat production of buffalo males Ph.D. Thesis. Faculty of Agriculture , Cairo University, Egypt.

Zeidan, Soheir, M.; A.F. El-Kholy; Mahasen, M. Mohamed and M.A.M. Salama (1999). Effect of rearing system on buffalo meat production of calves over fed 120% of their requirement from 6 to 12 months of age. Annals of Agric. Sci., Moshtohor, Vol. 37(3): 1635-1648.

Zeidan, Soheir, M.; Samira, A. Arafa and A.H. Etman (2003). Meat production from buffalo calves fed on different kinds of conserved green forages. Annals of Agric. Sci., Moshtohor, Vol. 41(1): 57-67.

Soliman, A.A.M. (1987). Utilization of different types of silage for fattened buffalo calves. M.Sc., Thesis, Fac. Agric., Al-Azhar Univ. Egypt.

Soloviev, A.A. (1966). Meat aging In "Food Industry" Pub. (Moscow) 53-81, 82-164, 242-303

Udin, V.M. (1967). Histological studies on the longissimus dorsi and semimembranosus muscles. Proceeding of Riazan-ski Research Eterinary Institute,17,37.Moscow.

Warwrrzymezak, S.; J. Karzewski; M. Wawrzynski and J. Kozlowski (2000). Effect of herbs mixture feeding on rearing performance of calves. Annals Animal Science, Roznki Naukowe Zootechniki.

تأثير الكسبرة والينسون كاضافات غذائية على نمو وصفات الذبيحة لعجول الجاموس المسمنة

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اجريت هذه التجربة فى محطة التجارب بسدس التابعة لمعهد بحوث الانتاج الحيوانى على ٢١ عجل جاموسى، متوسط أوزانهم عند بداية التجربة ١١٠ كجم، ومتوسط أعمارهم ٦ شهور. وتم تقسيمهم عشوانيا إلى ثلاث مجموعات، وكانت المجموعة المقارنة تتغذى على علف مصنع وقش أرز ودريس البرسيم، أما المجموعة الأولى والثانية تتغذى على نفس العليقة المقارنة مع إضافة كسبرة وينسون على التوالى بمعدل ٠,٠٤%/١ طن عليقة .

فى نهاية التجربة التى استمرت ٢٤٠ يوم كان الوزن الصائم للعجول أعلى فى مجموعة المقارنة عن مجموعة الكسبرة و مجموعة اليانسون وان كان استهلاك المادة الجافة لمجموعتى الكسبرة واليانسون اعلى بقيم غير معنويةعن مجموعة المقارنة ، تم ذبح ٣ عجول من كل مجموعة، وتم حساب *صفات الذبيحة وخصائص اللحم. وكانت النتائج كالأتى:-*

- كانت أعلى نسبة تصافى لمجموعة الكسبرة (٥٩%)
- أعلى نسبة تشافى كانت لمجموعة الكسبرة (٥١%).
- كانت مجموعة الكسبرة أفضل من حيث الطعم والرائحة.

وجد أن الفقد اثناء الطهى كان أعلى فى مجموعة المقارنة عنه فى مجموعتى الينسون و الكسبرة.

وهكذا يتضح ان اضافة الكسبرةالى عليقة عجول التسمين بنسبة ٤ كجم/ طن عليقة قد حسنت من نسب اللحم المشفى والعصيرية والطراوة وايضا من مساحة العضلة العينية. لذلك يفضل اضافة الكسبرة كمحسن طبيعى للحوم الجاموس.