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EFFECT OF SOME NATURAL ADDITIVES ON THE CARCASS CHARACTERISITICS OF THE EGYPTIAN BUFFALOE

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SUMMARY

Twelve buffalo calves, 272 kg body weight, were randomly allotted into three equal groups. Control group were fed on concentrate ration without any additive (C group), NSO group fed on concentrate ration with NSO oil (2kg/ton). N group fed on concentrate ration with Nutrisam (2kg/ton). Daily gain, slaughter weight, starch equivalent, digestible protein, empty body weight and EBW/LBW % showed non-significant difference among the experimental groups. Non- significant difference was recorded among the three groups for the hide, head, legs, total offals, total fat, residual weights, fore quarter, hind quarter and best ribs. At the end of experiment the calves of all three groups were slaughtered (most of them recorded 459.84 kg body weight) and scored almost the same EBW (408, 404 and 406 kg for C, NSO and N group, respectively). Total offals scored higher percentage in NSO group followed by N group and control group. Control group scored higher total fat percentage than the other two groups. Control, NSO and N carcasses scored almost the same proportions of entire cuts except those of brisket, fore ribs and sirloin, where control carcasses exceeded the other two groups for brisket percentage but NSO group excelled C and N for fore ribs and sirloin. The differences here were not significant. Round had the highest percentage of cold carcass weight in all groups. NSO carcass scored higher percent of high priced cuts than control and N groups.

Control group had lower pH of fresh round , ribs and eye muscle meats than the other two treated calves groups. Cooking loss percentage scored non-significant difference among the experimental groups. N group of calves improved the water holding capacity of meat by decreasing the EF percentage. Meat samples from N group had non-significant lower mean of the meat tenderness

than the other two groups. The same pattern of non- significant difference among the groups was recorded with the chilling loss percentage.

Our results revealed that adding NSO and Nutrisam in the diet of buffalo calves affect rumen pH and ammonia nitrogen. Although calves in two treatments had lower values in ammonia nitrogen than control ones and the difference was statistically non significant. Rations supplied by either NSO or Nutrisam had significant effect on molar proportions of propionic and butyric acids. Nutrisam fed calves exceeded propionic acid than C and NSO groups. Also N group had higher value in acetic / propionic ratio than the other two groups. The above mentioned results agreed with increased number of protozoa in Nutrisam group than protozoal count of NSO group.

Data showed significant increase of gamma globulins in serum of NSO and N groups in comparison with the control group.

The afromentioned results indicated that addition of either NSO or Nutrisam to the animal ration as food additives improve the carcasses characteristics and ensuring the beneficial and safe use of such food additives in animal rations.

Key words: feed additives; Natural; Nigella sativa oil; Sea algae extracts; Nutrisam; Toxicity; Meat production; Safety; Egyptian buffalos; carcasses characteristics.

INTRODUCTION

One of the best ways to increase the productive performance of farm animals is to improve the feed utilization and feed conversion. This improvement could be achieved through the feeding practices and the efficient use of feed additives. Additives are used to stimulate growth, improve the efficiency of feed utilization or improve the general health of the animal as reducing the incidence of acidosis, coccidosis and grain bloat, while others suppress estrus, reduce liver abscesses or control foot rot problems (Soroor, 2005).

Numerous studies have been done to evaluate the addition of fats or whole oil seeds to animal ration. The whole oil seeds were used as a source of energy (Palmquist and Jenkins, 1980), as well as a source of protein. It contains high oil (40 - 60 %) and high protein (about 20 %).

The seeds of Nigella sativa Linn. (Ranunculaceae), commonly known as black seed or black cumin, are used in folk (herbal) medicine all over the world for the treatment and prevention of a number of diseases and conditions that include asthma, diarrhea and dyslipidaemia. The seeds contain both fixed and essential oils, proteins, alkaloids and saponin. The pharmacological actions of the crude extracts of the seeds (and some of its active constituents, e.g. volatile oil and thymoquinone) that have been reported to promote protection against nephrotoxicity and hepatotoxicity

induced by either disease or chemicals. The seeds/oil have anti-inflammatory, analgesic, anti-pyretic, anti-microbial and anti-neoplastic activity (Ali and Blunden (2003). Agrawala et al (1968) have shown that Nigella Sativa had a galactagogue action. The galactagogue principle in Nigella Sativa is present in the lipid part and can be ether extracted. Rchid et al., (2004) recorded that Nigella sativa seed extracts enhance glucose-induced insulin release from rat-isolated Langerhans islets. Nigella sativa (black cumin) and Syzygium aromaticum (clove) oil are used for the treatment of inflammatory diseases and have anti-oxidant properties, Abdel-Wahhab and Aly (2005). Khan and Sultana (2005) suggest that Nigella sativa is a potent chemopreventive agent and suppresses ferric nitrilotriacetate (Fe-NTA) induced oxidative stress, hyperproliferative response and renal carcinogenesis in Wistar rats.

Nutrisame , the rich sea algae extract, is a natural feed supplement for animals. It has the following effects: strengthening the immune system, reduction of stress, lower susceptibility to diseases, activation of the flora of the intestinal tract and improvement of the metabolism. It contains in natural form the following: carbohydrates, minerals, trace elements, vitamins and amino acids (Neomed Pharma GmbH, 1997).

Food additives can be regarded as the safest constituents of animal daily food. The goal of the present work was to study the effect of some natural additives on the carcass characteristics in Egyptian buffalo.

MATERIALS AND METHODS

The experiment was carried out in buffalo farm belonging to the faculty of Agriculture, Cairo University. Twelve buffalo calves were randomly allotted to three equal groups. experimental starting weight was approximately 272 kg for the three groups. Group of buffalo calves were fed concentrate ration without any additive and served as control group (C group). The 2nd group of calves were fed on concentrate ration supplemented with Nigella Sativa Oil (2kg/ ton) as feed additive (Nigella Sativa Oil was obtained from Al Nouran company for natural foods, Heliopolis-Cairo- Egypt) and named as NSO group. The last group of buffalo calves were fed on concentrate ration supplemented with Nutrisam (2kg / ton) as feed additive and named as N group.

All animals were individually fed according to their live body weight (1kg ration / 50 kg live body weight) and were daily offered either berseem hay or rice straw ad-lib. The experiment extended for about 220 days. The concentrate mixture was composed of cotton seed cake (25%), maize grain (35%), wheat bran (20%), rice germ cake (15%), common salt (1.2%), limestone (3%) and minerals (0.8%). Concentrate mixture and water were offered twice daily. Body weight was weekly recorded for estimation of daily body

gain. All buffalo calves were vaccinated with foot and mouth disease vaccine according to the vaccination program of Ministry of Agriculture. Rumen samples were taken at the morning before feeding and drinking by using stomach tube with a suction pump from all animals before slaughter to determine pH by using Gallen- Kamp pH meter, molar proportion of individual volatile fatty acids (Erwine et al., 1961), protozoa count (Abo El-Naga, 1967) and ammonia nitrogen (Conway, 1963). Blood samples were taken before slaughtering of calves. These blood samples were used for estimation of serum protein profile according to Chin (1970) and for estimation of serum antibody titer against foot and mouth disease according to Stavitsky (1954) and cited by Seinen et al (1977), respectively. Slaughter weight (Live Body Weight, LBW), Starch Equivalent (SE), Digestible Protein (DP), Empty Body Weight (EBW) and the EBW / LBW % were estimated. SE and DP were estimated in ration according to Ghonium (1964). The hide, head, legs, total offals, total fat and residual weights were estimated as percentage of EBW. In addition, fore quarter (FQ), hind quarter (HQ) and best ribs weights were recorded as percentage of carcass after slaughter. The left side of each carcass was chilled for 24h at 5°C, then halved and quarter between 8th and 9th ribs into fore quarter (FQ) and hind quarter (HQ).The FQ was divided into: neck, shoulder, brisket, flat ribs, fore ribs and shin. The HQ was divided into: round, hind shank, sirloin, thick flank, thin flank and fillet. Each cut was estimated as percentage of carcass.

Physical Parameter:

The pH value of fresh round meat, fresh ribs meat and eye muscle was determined by using Beckman pH meter (Aitken et al., 1962) after 24h from slaughter. Cooking loss was estimated by cutting the meat samples into cube of about 100 gm (W_1) and were boiled in water for 45 minutes, then put in a heat tolerant plastic bag prior to boiling, air dried, left at room temperature and weighed (W_2).

$$\text{Cooking Loss} = \frac{W_1 - W_2}{W_1}$$

Expressible fluid was determined according to El-Kholy et al. (1997). Tenderness was determined according to Khalil (2000) using Warner-Brazelr machine (Warner-Brazler machine is a motorized instrument with the force-measured in pounds weight-required to shear through a cylindrical meat sample with a stainless steel cutting blade of special design, capacity 50 lb/cm). Chilling loss was determined by the difference between the hot carcass weight and the cold carcass weight.

Statistical analysis:

Data were analyzed by least squares analysis of variance using the general linear models procedure of the statistical analysis (SAS, 1990). Also, was performed by One -Way Analysis Of Variance (ANOVA) using Computer Micro Stat Program, Copyright (C) 1978-85 by Ecosft, Inc.

RESULTS AND DISCUSSION

Daily gain, slaughter weight, starch equivalent, digestible protein, empty body weight and EBW/ LBW % were recorded in (Table, 1).The previous mentioned parameters showed non-significant difference among the experimental groups. The hide, head, legs, total offals, total fat and residual weights were recorded as percentage of the corresponding EBW in (Table 2). In the same table, the fore quarter, hind quarter and best ribs were tabulated as percentage of the corresponding carcass. Non- significantly difference was recorded among the three groups for the previous mentioned parameters in (Table, 2). The calves of all three groups were scored at EBW (408, 404 and 406 kg for C, NSO and N group, respectively). Feed conversion is considered as an important economic parameters used to evaluate the performance of producing beef. The live body weight increased normally with development of age. El-Kholy (1991) reported that the dressing percentage is the ratio of carcass weight to live body weight, expressed as a percentage basis. He also recorded that, increase the accuracy of this estimate empty body weight could be used instead of live body weight, and cold carcass weight instead of hot carcass weight. Our results

Table (1): Daily body gain, LBW, SE, DP, EBW and EBW/LBW % of control, NSO and N treated gorups.

Groups Parameters	Overall mean (12 calves)	Control (4 calves)	Nigella Sativa Oil (4 calves)	Nutrisam (4 calves)	P<F
Dairly body gain (kg)	0.86 ± 1.47	0.88 ± 0.02	0.84 ± 0.02	0.85 ± 0.0002	NS
Slaughter weight (LBE)-(Kg)	459.84 ± 1.47	465.52 ± 5.27	455.64 ± 5.2	458.35 ± 5.35	NS
Starch equivalent (SP/kg ration)	892.54 ± 0.04	892.36 ± 0.11	892.36 ± 0.11	892.59 ± 0.12	NS
Digestigle protein (DP/kg ration)	148.67 ± 0.02	148.67 ± 0.15	148.73 ± 0.15	148.6 ± 0.16	NS
SE/kg Gain	4.78 ± 0.02	4.74 ± 0.13	4.84 ± 0.13	4.67 ± 0.13	NS
DP/kg Gain	0.80 ± 0.0	0.79 ± 0.02	0.81 ± 0.02	0.79 ± 0.02	NS
Empty body weight (EBW)-(Kg)	406.45 ± 00.65	408.57 ± 6.02	404.76 ± 5.93	406.03 ± 6.1	NS
EBW/LBW %	88.39	87.74	88.83	88.6	NS

N= No. of animals/group = 4 Values indicate means ± SE.

Table (2): Hide, head, legs, total offals, total fat and residual weights as percentage of corresponding EBW as well as FQ; HQ and best ribs as percentage of corresponding carcasses of control and treated gorups.

Groups / Parameters	Overall mean (12 calves)	Control (4 calves)	Nigella Sativa Oil (4 calves)	Nutrisam (4 calves)	Pr<F
Empty body weight (EBW)-(kg)	406.45 ± 0.65	408.57 ± 6.02	404.76 ± 5.93	406.03 ± 6.1	NS
Hide weight (kg)	47.42 ± 1.02	47.07 ± 4.09	44.07 ± 4.04	51.11 ± 4.15	NS
Hide weight/ EBW %	11.67	11.52	10.89	12.59	NS
Head weight (kg)	25.5 ± 0.15	27.99 ± 1.31	24.53 ± 1.29	23.98 ± 1.32	NS
Hide weight/ EBW %	6.27	6.85	6.06	5.9	NS
Legs weight (kg)	11.46 ± 00.19	11.42 ± 0.79	10.83 ± 0.79	12.13 ± 0.81	NS
Legs weight/ EBW %	2.82	2.8	2.68	2.98	NS
Total offals (kg)	15.44 ± 0.04	14.88 ± 0.13	15.6 ± 0.13	15.84 ± 0.13	NS
Total offals/ EBW %	3.79	3.64	3.85	3.90	NS
Total fat weight (kg)	9.12 ± 0.30	9.37 ± 1.46	10.01 ± 1.44	9.97 ± 1.48	NS
Total fat weight/EBW %	2.24	2.29	2.47	2.46	NS
Residual weight (kg)	3.88 ± 0.1	4.11 ± 0.46	4.06 ± 00.45	3.47 ± 0.47	NS
Residual weight/EBW %	0.96	1.01	1.000	0.85	NS
Carcass (FQ + HQ) (kg)	118.72 ± 0.91	120.69 ± 1.7	120.39 ± 1.6	115.07 ± 1.69	NS
Fore quarler (FQ)) (kg)	53.84 ± 0.19	5.4.61 ± 1.22	53.48 ± 1.2	53.44 ± 1./33	NS
Hind quarter (HQ) (kg)	64.88 ± 0.82	66.08 ± 1.95	66.92 ± 1.92	61.63 ± 1.97	NS
(FQ/ Carcass %	45.35	45.25	44.4	45.4	NS
HQ/ Carcass %	54.65	54.75	55.6	53.5	NS
Best ribs (kg)	4.023 ± 1.16	4.508 ± 0.24	3093 ± 0.24	3.63 ± 0.25	NS
Best ribs/ Carcass %	3.389	3.735	3.264	3.155	NS

N= No. of animals/group = 4 Values indicate means ± SE.

excelled than obtained by El-Kholy et al (1997), they reported that EBW was 379.25 kg when slaughter at 420 kg live weight. Also, EBW was 361.6 and 386.1 kg for calves implanted with Ralgro and Synovex- s. In our study NSO group had higher dressing percentage may be due to calves in this group had lower percentage of hide and legs (13.54 %) than C and N group (14.31 and 15.53 %, respectively). Dressing percentage is affected by genetic and environmental factors El-Kholy (1991). Zinn (1992) reported that supplementation of growing- finishing diets with up to 6% (0.45 kg / day) of fat did not directly influenced body composition of steers.

El-Kholy et al (2003) found that addition of 5% calcium salts of fatty acids to fattening calves diets improved both hot carcass weight and dressing percentage by about 26.2% and 9.5%, respectively. Sutter et al (2000) conducted an experiment in which fattening Brown Swiss bulls were fed diets containing 3% rumen protected crystalline fat, coconut oil, whole crushed rapeseed, sunflower seed or linseed. They reported that, carcass tend to be leaner with fat supplements. Also there were no significant effect on dressing percentage, conformation score, final PH, cooking loss, shear forces, dry matter and fat collagen percentages due to fat supplement.

Total offals scored higher percentage in NSO group (3.84) followed by N group (3.71) and control group (3.63). Control group scored higher total fat percentage (2.27) than the other 2 groups (2.08 for NSO and 1.96 for N group). Soliman (1987) indicated that the percentage values of the carcass organs related to fasting live body weight were 9.95- 10.96% for hide, 5.56- 6.19% for head and 2.56-2.73% for legs in buffalo calves fed on different types of forage. Iberra (1988) showed that the offals of carcass in Philippine buffalo were 2.0% for liver, 0.6% for heart, 0.9% for lungs, 0.2% for kidneys and 0.2% for spleen relative to slaughter weight. Nada (2003) reported that the percentage of liver, heart, lungs, kidney, spleen and testis to empty body weight were 1.3, 0.3, 1.3, 0.3, 0.2 and 0.1, respectively.

Table (3) showed weights of entire cuts as percentages of the corresponding hole carcass. Control, NSO and N carcasses scored almost the same proportions of entire cuts except those of brisket, fore ribs and sirloin, where control carcasses exceeded other two groups (NSO and N groups) by 1.12 and 0.36 % for brisket percentage but NSO group excelled C and N for fore ribs and sirloin (high price cuts) by 1.11 and 0.91 %) and (0.97 and 1.35%). The differences here were not significant. Round had the highest percentage of cold carcass weight (CCW) in all groups (30.51, 30.46 and 31.64 % for C, NSO and N groups, respectively). NSO carcass scored higher percent of high priced cuts (fore ribs, 9.42 and sirloin, 9.96) than control and N groups. Other studies (Sadek et al., 1995 and El-Kholy et al., 1997) showed lower values than recorded here. Moreover, Ra-

Table (3): Weights of the entire cuts as percentage of the corresponding hole carcasses of control, NSO and N treated calves groups.

Groups / Parameters	Overall mean (12 calves)	Control (4 calves)	Nigella Sativa Oil (4 calves)	Nutrisam (4 calves)	Pr<F
Carcass weight (kg)	118.72 ± 0.00)	120.69 ± 1.7	120.39 ± 1.6	115.07 ± 1.69	NS
Neck weight	10.21 ± 00.001	10.73 ± 0.01	9.67 ± 00.009	10.23 ± 0.029	NS
Neck/Carcass %	8.6	8.89	8.03	8.89	NS
Shoulder weight	17.78 ± 0.002	17.81 ± 0.013	17.18 ± 0.012	18.30 ± 0.13	NS
Shoulder %	14.98	14.76	14.27	15.9	NS
Brisket weight	7.81 ± 0.002	8.53 ± 0.008	7.16 ± 0.007	7.72 ± 0.008	NS
Brisket/Carcass %	6.58	7.007	5.95	6.71	NS
Flat ribs weight	2.99 ± 0.001	2.46 ± 0.006	3.16 ± 0.005	2.89 ± 0.006	NS
Flat ribs/Carcass %	2.52	2.04	3.0	2.51	NS
Fore ribs weight	10.39 ± 0.002	10.03 ± 0.0009	11.34 ± 0.008	9.80 ± 00.009	NS
Fore ribs/Carcass%	8.75	8.31	9.42	8.51	NS
Shin weight	4.55 ± 0.0003	4.54 ± 0.002	4.500 ± 0.002	4.58 ± 0.002	NS
Shin/Carcass %	3.83	3.76	3.74	3.98	NS
Round weight	36.65 ± 0.002	36.82 ± 0.006	36.67 ± 0.005	36.41 ± .006	NS
Round/Carcass %	30.87	30.51	30.46	31.64	NS
Hind skank weight	4.96 ± 0.0002	4.95 ± 0.001	4.98 ± 0.001	4.94 ± 0.001	NS
Hind shank/Carcass %	4.18	4.1	4.14	4.29	NS
Sirloin weight	10.91 ± 0.003	10.85 ± 0.009	11.99 ± 0.008	9.91 ± 00.0009	NS
Sirlom Carcass %	9.19	8.99	9.96	8.61	NS
Thick flank weight	4.25 ± 0.0001	4.22 ± 0.004	4.39 ± 0.002	4.13 ± 00.0002	NS
Thick flank/Carcass %	3.58	3.5	3.65	3.59	NS
Thin flank weight	5.400 ± 0.0003	5.48 ± 0.005	5.66 ± 0.005	5.006 ± 0.0005	NS
Thick flank/Carcass %	4.55	4.54	4.7	4.4	NS
Fillete weight	3.48 ± 0.001	3.32 ± 0.005	3.41 ± 0.004	3.69 ± 0.005	NS
Fillete/Carcass %	2.93	2.75	2.83	3.21	NS

N= No. of animals/group = 4 Values indicate means ± SE.

ghep et al. (1989) noticed that weight of boneless meat was 193 kg and 164 kg, respectively for groups of buffalo male calves on low and high level of energy. The difference between groups was significant ($p<0.01$). El-Kholy (1991) slaughtered 16 males Friesian and buffalo calves at 450 kg slaughter weight. The author found that the percentage of boneless meat relative to empty body-weight was greater in Friesian calves than buffalo calves. The difference between the two genotype was highly significant (52.5 and 46.3%, respectively).In contrary, the results obtained by El-Feel et al (1993). They found that feeding buffalo 100 and 120% of requirement did not affect boneless meat percentage (80.9 and 80.6%, respectively) and hind quarter percentage (47.4 and 46.1%, respectively) relative to hot carcass weight. Gigli et al (1993) indicated that age and ration affected the carcass component of Italian buffalo. Mandell et al (1995) studied the effects of diets on growth performance and carcass composition. They reported that feeding strategy did not affect rib eye area, marbling score or the concentration of intra-muscular (marbling) fat. Nada (2003) reported that fore quarter, hind quarter cuts or it is percentage of cold carcass weight, boneless meat and bone percentage did not significantly affected by different diets. The overall mean weights were 10.92, 16.34, 7.36, 4.62, 10.40, 4.45, 35.58, 3.14, 11.95, 4.80, 3.58 kg for neck, shoulder, brisket, flat ribs, fore ribs, shin, round, fillet, sirloin, hind shank, thick flank and thin flank cutís, respectively. Fore quarter and hind quarter were discussed by several investigators (El-Ashry et al., 1988 ; Iberra, 1988 ; El-Feel et al., 1993 and El-Kholy, et al., 1997). El-Asheeri (1992) indicated that the percentage of lean, fat and bone in buffaloes calves were 63.0, 11.31 and 25.69% for the 9th rib, 63.94, 11.45 and 24.60 % for the 10th rib and 60.98, 12.36 and 26.66% for 11th rib in buffalo calves slaughtered at 24 months of age. Sami (1996) pointed out that the percentages of lean, fat and bone in buffaloes calves for the three best rib cuts 9th, 10th and 11th were 61.88, 17.48 and 20.64 % , respectively in buffalo calves. Nada (2003) found that the percentage of best ribs weight from CCW were 3.5%. Also the author reported that the boneless meat and boneless meat percentage were (2.76 kg and 67.87 %). Also the author decided that the bone weight and bone percentage were (0.76 kg and 18.6%) for buffalo calves.

Physical characteristics of carcasses (pH, cooking loss %, expressible fluid %, meat tenderness and chilling loss %) of control and treated calves were presented in (Table 4). Control group had lower pH of fresh round meat and fresh ribs meat (5.13 and 5.16), while these values were (5.53 and 5.76 for NSO group) and (5.98 and 5.5 for N group). Moreover, control group had lower fresh eye muscle pH (4.97) than the other two treated calves groups (5.06 and 5.38 for NSO and N, respectively). This is mean that using Nigella Sativa Oil and Nutrisam as feed additives improved physical properties in buffaloes meat.

Table (4): Physical characteristics (PH, cooking loss %, expressible fluid %, meat tenderness and chilling loss % of control, NSO and N treated calves groups.

Parameters \ Groups	Overall mean (12 calves)	Control (4 calves)	Nigella Sativa Oil (4 calves)	Nutrisam (4 calves)	
pH of fresh round meat	5.55 ± 0.12	5.13 ± 0.27	5.53 ± 00.26	5.98 ± 0.28	
pH of fresh ribs meat	5.47 ± 0.09	5.16 ± 0.28	5.76 ± 0.27	5.5 ± 0.28	
pH of fresh eye muscle	5.140 ± 0.006	4.97 ± 0.32	5.06 ± 0.23	5.38 ± 00.33	
Cooking loss %	53.14	53.0	53.1	53.33	
Expressible fluid %	69.5	71.62	71.55	65.31	
Tenderness (kg/cm^2)	2.610 ± 0.02	2.65 ± 0.05	2.64 ± 0.06	2.53 ± 0.06	
Chilling loss %	2.84	3.04	2.71	2.77	NS

N= No. of animals/group = 4 Values indicate means ± SE.

Table (5): Rumen parameters (PH, molar proportion of individual volatile fatty acids, protozoa count and ammonia nitrogen) of control, NSO and N treated

Parameters \ Groups	Overall mean (12 calves)	Control (4 calves)	Nigella Sativa Oil (4 calves)	Nutrisam (4 calves)	Pr<F
pH of rumen fluid	6.1 ± 0.05	6.06 ± 0.25	6.29 ± 0.24	5.96 ± 0.25	NS
Acetic acid	45.59 ± 13.161	45.82 ± 0.62	45.04 ± 0.614	45.907 ± 0.632	NS
Propionic acid	25.94 ± 7.48	25.6 ± 0.64	24.98 ± 0.63	27.24 ± 0.651	NS
Buteric acid	18.079 ± 5.219	18.70 ± 0.21	18.24 ± 00.2	17.298 ± 0.208	NS
Propionic acid/ buteric acid %	56.90	55.88	55.46	59.37	NS
Protozoa count/mm^3	8.853 ± 2.555	10.13 ± 1.00	7.13 ± 0.987	9.300 ± 1.015	NS
Ammonia (mg/100 mm rumen fluid)	3.00 ± 0.02	4.200 ± 00.02	2.4 ± 0.02	2.37 ± 0.0002	NS

N= No. of animals/group = 4 Values indicate means ± SE.

It's well known that consumer satisfaction depends on the physical characteristic of meat. In Egypt more attention is paid to the quantity more quality. Preston and Willis (1975) reported that the two important characteristics of meat for consumer are the colors and flavors when buying and eating the meat. Most of the physical properties of meat are directly or indirectly related to pH value Hall et al (1944). They showed that lean tissues were bright at pH 5.6 and dull, shady or dark at lower or lighter pH values. The lightness or darkness of meat is known to be relating to its pH. Sami (1996) reported that the most of the physical properties of meat are related with pH-value directly or indirectly. Oreskovich et al (1992) reported that ultimate pH-value of bovine muscle was 5.54. Jones and Tatum (1994) stated that the mean pH-value at 3 hours and 24 hours post-mortem of bovine Longissimus dorsi muscle was 6.27 and 5.72, respectively. El-Kholy et al (2000) observed that pH-value 5.63 in fresh meat of buffalo. Lawrie (1991) stated that both rate and extent of post-mortem fall of pH are influenced by intrinsic factors such as species, type of muscle, variability between animals as well as extrinsic factors as environmental temperature and cooling rates. These results were within the values obtained by El-Bedawy et al (1996a) who found that the pH of eye muscle was increased for the fat supplemented group (6.00) compared with the control one (5.78). However, Sami (2001) suggested that there were no significant differences in meat pH of bulls fed protected fat.

Cooking loss percentage in control and treated groups was illustrated in (Table 4). Cooking loss percentage s cored non-significant difference between the control and treated groups. The same pattern was observed at the comparison between the NSO and N treated groups. The cooking loss % in control, NSO and N calves groups scored 53.0, 53.1 and 53.33, respectively. The loss in meat weight due to cooking by any methods depends on the content of moisture and fat in meat. Cooking loss was found to increase as the moisture percentage increased in the muscle (El - Asheeri, 1992). Our result was similar to obtained by El-Kholy et al (2000) and Salem et al (1982). Hawrysh et al (1985) stated that cooking loss of bovine Longissimus dorsi muscles with high pH was lower than that of low pH muscles. Dikeman et al (1986) recorded that age and level of dietary energy did not significantly affect cooking loss. Cooking loss percentage was recorded by several authors to be 25.82% (Meade et al., 1992) ; 23.64% (Oreskovich et al., 1992) ; 24.13% for the high energy ration and 31.17 for the low energy ration (Gigh et al., 1993) ; 48.40% (El-Kholy et al., 2000) and 47.17 (Nada, 2003).

The results in (Table 4) showed that the C and NSO group of calves exceeded N group bulls in expressible fluid % (EF): percentage (71.62, 71.55 and 65.31 %, respectively), but the difference was not significant. From these results it seems that N bulls group improved the water

holding capacity of meat by decreased the EF percentage although this decreasing non significant. The exudation of fluid or water from meat under the influence of external forces such as pressure or heat is known as expressible fluid. The amount and percentage of the fluid may be influenced by the protein percentage, water/ protein ratio and the mode of cutting (El- Asheeri,1992). Our results were higher than reported by Sami (1996), 40.45 and 39.87 % for Friesian and buffalo calves slaughtered at 420 kg live weight. Salem et al (1982) obtained that there is a positive relationship between protein and expressible fluid percentage. El-Asheeri (1992) reported that protein percentage, water / protein ratio and the mode of cutting might influence the amount and percentage of the fluid. In addition, Feeding rations containing protected fat had no significant effect on water holding capacity. El-Bedawy et al (1996a) and Sami (2001) reported that expressible fluid percentage of longissimus dorsi muscle decreased by feeding fat supplemented ration. El-Kholy, et al (2000) reported that the percentage of high priced cuts and boneless meat percentage relative to cold carcass weight in buffaloes was 50.81 and 41.43%. Nada (2003) reported that the high priced cuts are the most expressive commercial joints in carcass. Butcher always selects carcass had the highest proportion of expensive joints. The high priced cuts weight and their percentage to cold carcass weight were (59.28 kg and 52.3%) for buffaloes calves.

Meat tenderness (kg/cm_2) and chilling loss percentages of the different groups were recorded in (Table 4). Our results revealed that meat samples from N group had non significant lower mean of the meat tenderness (2.53 kg/cm_2) than the other two groups NSO and control groups (2.64 and 2.65 kg/cm_2, respectively). The above mentioned results cleared that calves fed Nutrisam improved meat tenderness than other two groups (NSO and C) although this improvement non significant. The same pattern of non- significant difference among the groups was recorded with the chilling loss percentage. These results were excelled than reported by EI- Kholy et al (2000) (3.67 and 4.80 kg / cm_2) for FR and buffalo calves and calves implanted with Rolgro and Synovex-s (4.31 and 4.10 kg/cm_2)and control ones 4.30 kg/cm_2.

Offer and Trinick (1983) reported that fresh meat at slaughter contains about 75% water which subjects to variations due to gains occur during processing or losses through drip, evaporation or cooking. Such gains or losses are important for the consumer satisfaction because juiciness and tenderness of meat depend to a great extent on its water content; moreover, excess drip produces an unattractive appearance. Lawrie (1991) stated that species, age and muscular function affect (WHC) of meat. The onset of rigor mortis is accompanied by lowering of WHC which is due to drop of pH, denaturation of sarcoplasmic proteins, disappearance of ATP and the consequent formation of actomyosin. Zeidan (1998) reported

that the water holding capacity was 6.29 cm2 for buffaloes calves weights 436 kg. Udin (1967) reported that the highest tenderness value of meat may be attributed to the high content of fat. Feeding protected fat in rations increased tenderness of the muscle of lambs fed 8% of diet. El-Bedawy et al (1996b) and Sami (2001) found that the tenderness values were almost similar between bull fed the control and fat supplemented diets being 9.93 and 9.60, respectively.

Rumen parameters (pH, molar proportion of individual volatile fatty acids, protozoa count and ammonia nitrogen) were recorded in (Table 5). Our results revealed that adding NSO and Nutrisam in the diet of buffalo calves affect rumen pH and ammonia nitrogen. Ammonia nitrogen values showed non-significant decrease in two treatments (NSO and N groups) at the comparison with control one. . Above mentioned result had lower values in PH and ammonia nitrogen than reported by El-Kholy and Salama (1995) and Sami (1996). El-Dakhakhny et al (2000a) found that the administration of NSO in rats produced a significant increase in mucin content and glutathione level and a significant decrease in mucosal histamine content. So, it can be concluded that NSO showed a protective action against chemical (e.g., ethanol) induced ulcer in rats.

Molar proportion of volatile fatty acids were presented in (Table 5). Ration supplied by either NSO or Nutrisam had significant effect on molar proportions of propionic and butyric acid. Nutrisam fed calves exceeded (27.24 %) propionic acid than C and NSO groups (25.6 and 24.98 %, respectively). Also N group had higher value in propionic/acetic ratio (59.37) than other two groups (55.88 and 55.46 for control and NSO groups, respectively.) The above mentioned results agreed with increased number of protozoa in Nutrisam group (9.300/mm_3) than protozoa count of NSO group (7.13/mm_3).

The effect on serum protein profile of control and treated buffalos is presented in (Table 6) and (Fig. 1). Data showed significant increase of gamma globulins in Nigella Sativa Oil and Nutrisam treated animals in comparison with control group but non-significant increase at the comparison between Nigella Sativa Oil and Nutrisam treated buffalos. The same pattern was observed with beta globulins but with significant increasement in this level at the comparison between Nigella Sativa Oil and Nutrisam treated animals. Concerning the alfa-globulins the results showed significant increase in this protein at the comparison between the control and Nutrisam treated animals and between Nigella Sativa Oil and Nutrisam treated group. On the other hand, non-significant increase in this protein was observed at the comparison between the control and Nigell Sativa Oil treated groups. In addition significant reduction in albumin was observed among the groups especially at the comparison between control and Nutrisam treated buffalos. Skrivanova

Table (6): Serum protein profile of control, NSO and N treated calves groups.

Groups / Parameters	Alfa %	Beta %	Gamma %	Albumen %
Control (C)	10.833 ± 0.664	10.063 ± 0.918	10.873 ± 0.814	68.234 ± 1.386
Nigell sativo oil (NSO)	11.868 ± 0.641	12.35 ± 0.444	15.663 ± 0.470	60.87 ± 0.896
Nutrisam (N)	13.143 ± 0.610	15.463 ± 0.374	17.595 ± 0.9300	53.8001 ± 1.518
LSD for group	2.04	2.10	2.441	4.14

N= No. of animals/group =4 LSD= Least Significant Difference
Vallues indicate means ± SE.

and Marounek (1993) studied the effect of supplying a peptolide antibiotic virginiamycine as food additive) to milk feed-calves. They recorded significant increase in growth (body gain), molar percentage of propionate and decreased molar acetate: propionate ratio in rumen fluid but cause lowered serum protein and urea as well as tend to decrease the activity of aminotransferases. El-Dakhakhny et al. (2000b) reported that Nigella Sativa Oil showed a favorable effect on the serum lipid pattern where the administration of the Nigella Sativa Oil (800 mg/kg orally for 4 weeks) caused a significant decrease in serum total cholesterol, low density lipoprotein, triglycerides and a significant elevation of serum high density lipoprotein level.

The antibody titer against foot and mouth disease in control , Nigella Sativa Oil and Nutrisam treated buffalos were recorded in (Table 7) and (Fig. 2). Data showed significant increase in antibodies titers of Nutrisam treated group in comparison with the other groups and non-significant increase in the titer at the comparison between control and Nigella Sativa Oil treated buffalos. The immune system is primarily responsible for defense against invading organisms, Sharma (1993). Ali and Blunden (2003) reported that, the administration of either Nigella sativa seed extract or its oil has been shown not to induce significant adverse effects on liver or kidney functions. It would appear that the beneficial effects of the use of the seeds and thymoquinone might be related to their cytoprotective and antioxidant actions, and to their effect on some mediators of inflammation. Zaoui et al (2002) suggests a wide margin of safety for therapeutic doses of Nigella sativa fixed oil, but the changes in hemoglobin metabolism and the fall in leukocyte and platelet count must be taken into consideration. Salem (2005) reported that, the oil and certain active ingredients of N. sativa seeds

Table (7): Serum antibody titers of against foot and mouth disease by haemagglutination test (HA) in control, NSO and N treated calves groups.

Groups / Cases	Haemagglutination Titer		
	Control	Nigella Sativa Oil	Nutrisam
1	4	4	8
2	4	8	8
3	2	2	16
4	2	4	16
Mean ± SE	3 ± 0.6	4.5 ± 1.3	12 ± 2.31
LSD for group	4.97		

N = No. of animals / group = 4 LSD = Least Significant Difference

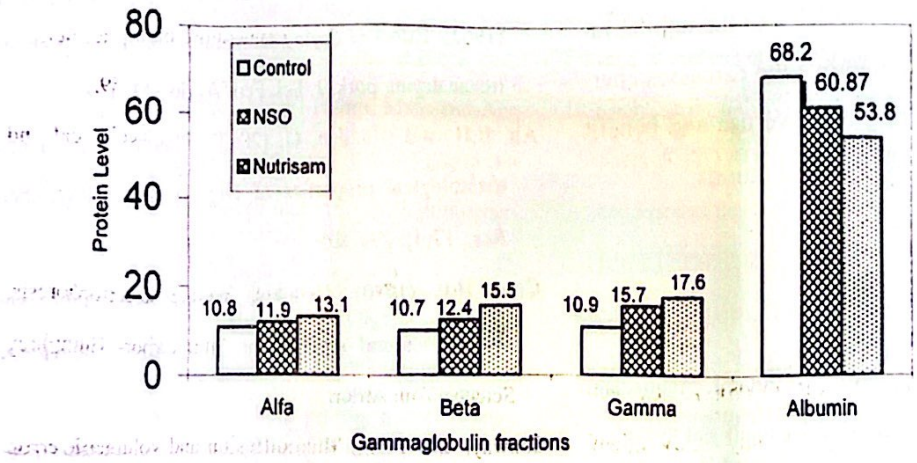

Fig. (1): Serum gammaglobulin fractions and albumin (mg %) of control, Nigella sativa Oil and Nutrisan treated calves groups

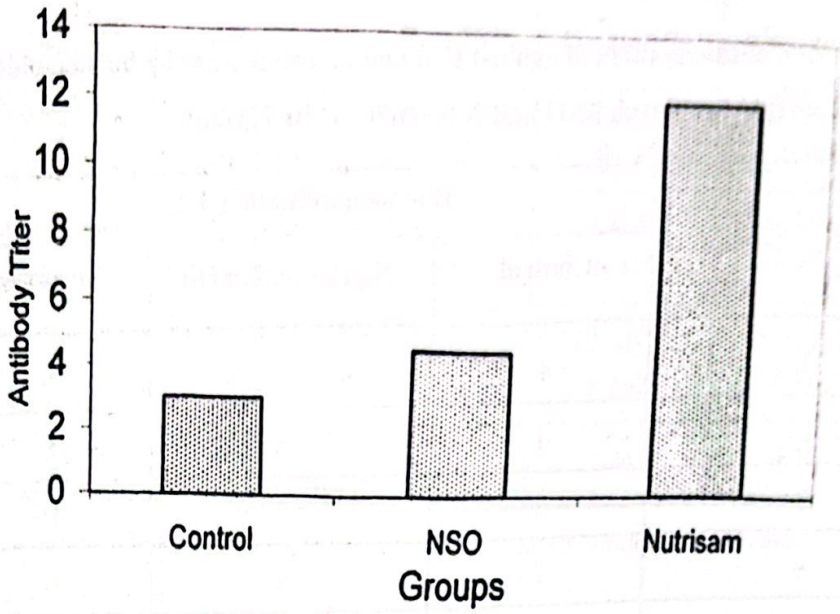

Fig. (2): Titer of antibody (HA unite) against foot and mouth disease of vaccianted control, Nigella sativa oil and nutrisam treated buffalos.

showed beneficial immuno- modulatory properties, augmenting the T cell- and natural killer cell-mediated immune responses.

CONCLUSION

The fore-mention results indicated that the addition of either NSO or Nutrisam to the animal ration as food additive improve the carcasses characteristics and ensuring the save use and benefit of such food additives in animal rations.

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تأثير بعض الإضافات الطبيعية على خواص الذبيحة فى الجاموس المصرى

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أجريت هذه الدراسة على 12 عجل جاموس موزعة عشوائياً على ثلاث مجموعات متساوية (4 فى كل مجموعة) حيث تم تغذية المجموعة الأولى على عليقة مركزة بدون أى إضافات (المجموعة الضابطة) وتغذية المجموعة الثانية على نفس العليقة مضافاً إليها 2 كجم/ طن زيت حبة البركة وسميت مجموعة زيت حبة البركة (مجموعة NSO)، وغذيت المجموعة الثالثة على نفس عليقة المجموعة الضابطة مضافاً اليها 2 كجم/طن من مادة النوتريزام وسمت بمجموعة النوترايزام (مجموعة N).

وتهدف هذه الدراسة إلى معرفة تأثير بعض إضافات الأعلاف الطبيعية على خواص الذبيحة فى عجول الجاموس التى تربى بغرض التسمين . وقد أظهرت الدراسة النتائج التالية:

لم يكن هناك إختلافات معنوية على كل من معدل الزيادة اليومية ووزن الذبح. كان وزن الجسم الفارغ متقارب وليس هناك فروق معنوية بين الثلاث مجموعات 408, 404, 406 على التوالى (المجموعة الضابطة ، مجموعة NDO ومجموعة N). حققت الأحشاء الكلية نسبة أعلى فى مجموعة NSO متبوعة بمجموعة النوتريزام ثم المجموعة الضابطة. بينما حققت المجموعة الضابطة مستوى أعلى فى نسبة الدهن الكلية من المجموعتين الآخريين. حققت كل من مجموعتى N, NSO قيماً متقاربة لنسب القطيعان المختلفة لإستثناء قطعية لحم الصدر (Brisket) وقطعية لحم الضلوع (Fore ribs) وقطعية لحم القطن (Sirloin) حيث زادت المجموعة الضابطة فى نسبة قطعية لحم الصدر بينما تميزت مجموعة NSO عن مجموعة المقارنة ومجموعة N في كل من القطعيان الممتازتان (لحم الضلوع ولحم القطن) رغم أن الإختلافات لم تكن معنوية من الناحية الإحصائية. حققت مجموعة NSO أعلى نسبة من القطعيان الممتازة عن كل من المجموعة الضابطة ومجموعة النوتريزام. حققت المجموعة الضابطة قيماً أقل لدرجة الأس الهيدروچينى للحم الطازج (pH) لكل من لحم الفخذ وأيضاً قيماً أقل لدرجة الأس الهيدروچينى للحم العضلة العينية عن المجموعتين الآخريين. مما يعنى أن إستخدام كل من زيت حبة البركة والنوتريزام يفيد فى تحسين الخصائص الطبيعية للحم الجاموس. الفقد بالطهى (Cooking loss) لم يظهر أى فروق معنوية بين المجموعات. إنخفضت نسبة العصارة الناتجة من الضغط (Expressible fluid) فى المجموعة الضابطة ومجموعة NSO عن مجموعة N إنخفاضاً غير معنوى مما يوضح أن مجموعة العجول المضاف لها النوتريزام حسنت من قدرة اللحم على الإحتفاظ بالماء (Water Holding Capacity) من خلال خفضها لنسبة العصيرية. المجموعة المعاملة بالنوترايزام (N) حسنت الطراوة (Tenderness) بالمقارنة بالمجموعات الأخرى بالرغم من أن التحسن لم يكن معنوى.

خصائص الكرش:

أظهرت النتائج أن إضافة زيت حبة البركة (مجموعة NSO) والنوتريزام ((N) للعجول الجاموس أثرت على درجة الأس الهيدروچينى للكرش ونيتروچين الأمونيا. إضافة كل من زيت حبة البركة والنوتريزام كانتا ذات تأثير معنوى على نسبة الأحماض الدهنية الطيارة لكل من حمض البروبيونيك والبيوتريك وزادت نسبة البروبيونيك فى مجموعة النوتريزام عن المجموعة الضابطة ومجموعة NSO وكذلك كانت مجموعة النوتريزام أعلى فى نسبة البروبيونك/أسيتك عن المجموعتين الأخريين والذى أوضح أن مجموعة النوترايزام سببت زيادة فى عدد بروتوزوا الكرش عن المجاميع الأخرى. الزيادة المعنوية فى نسبة الجاماجلوبيولين فى المجموعات المعاملة N, NSO مقارنة بالمجموعة الضابطة. ومن النتائج السابقة يتضح أن إستخدام زيت حبة البركة والنوتريزام كإضافات حسنت خصائص الذبيحة ويؤكد منفعة وأمان إستخدام هذه الإضافات الغذائية فى علائق الحيوان.