EFFECT OF FEEDING BY SALT TOLERANT VEGETABLE WASTES ON GROWTH PERFORMANCE AND FEED EFFICIENCY OF MALE GOATS

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ABSTRACT

Feed for animals are getting high prices. Utilizing salt tolerant vegetable wastes in feed composition for male goats is of paramount importance. Thirty male goat kids of eight weeks age (weaning age) were raised until an age of twenty-four weeks age. All male kids received the same treatment during this period. Immediately after weaning, these kids (males are of 9.4 kg average body weight) were divided into 5 groups, G1 (control group) was fed 100% concentrate feed mixture (CFM); G2 was fed 100% saline artichoke waste feed; G3 was fed 100% saline Carrots waste feed; G4 was fed 50% (CFM) feed and 50% saline Artichoke waste feed (CFM) feed and G5 was fed 50% (CFM) feed and 50% saline Carrot waste feed. The highest significant values of changes in body weights and daily weight gain were recorded for G1 followed by G2, G4, G5, then G3. Highest significant values of DM, OM, EE and NFE on the nutrients digestibility coefficient of the goats was recorded for G1, followed by G2, G4, G5, then G3. There were significant differences in some blood parameters i.e. total protein, albumin, globulin, urea, creatinine, and GPT. It can be concluded that feeding salt tolerant vegetable wastes had positive impact on growth performance and feed efficiency in male goats.

Keywords: artichoke, carrots, performance, blood, digestibility, goat kids, wastes

INTRODUCTION

Water is the basic substance of life on earth, and it is increasingly in short supply. Water shortages affect 88 developing countries that are home to half of the world's population in these places (Miller, 2003). Saline water represents 97% all over the world. Salt tolerant vegetables can fill–to some extent- the gap in food production.

Water issues are most important in within future. Egypt is one of the poorest 35 countries in the world in the ownership of fresh water resources. Due to the limited availability of water resources for agriculture and the increasing demand of horizontal and

vertical expansion of the cultivated area, as well as increasing population, it was necessary to use non-traditional sources of water in agricultural (Capmas, 2010).

In commercial goats' production, feed consumption is one of the critical points. Feed costs represent over 70% of the ruminant rations (Larzul & De Rochambeau 2005). Feed for animals is getting high prices. Therefore, it is crucially important to search for ration's ingredients alternatives. Salami *et al.* (2019), emphasized the role of plant by-products as an important human-inedible feed resource for livestock production. The use of plant by-products could promote low-input, low-emission feeding strategies to mitigate the environmental impact of the ruminant sector. Pomegranate seed pulp, pistachio hulls, and tomato pomace can be used as replacement of wheat bran to goats without adverse effects on their performance as well as ruminal fermentation (Razzaghi *et al.*, 2015). Correddu *et al.* (2019) observed significant interaction among dietary treatment and sampling time on daily feed intake, animal performances and milk coagulation properties. In Egypt, about 8617 feddans were cultivated with Artichoke with an approximate yield 7.84 tons/feddan. Considerable amounts of agricultural wastes were generated from Artichoke canning industry which provided good feed mixture for ruminants (Salman *et al*., 2014).

In Egypt, about 10952 feddans were cultivated with Carrot with an approximate yield of 18-20 tons/feddan. Carrot leaves are source of carbohydrates and protein as well as some minerals such as potassium **(**Goneim *et al***.,** 2011**).** The ability of carrot plants to tolerate frost render it suitable for cultivation throughout the year. Leaves and stems of carrots, were used as a non-conventional green fodder **(**Banerjee, 1998**).**

The objectives of this study are to test the impacts of using salt tolerant vegetable wastes (artichoke and carrot) in feeding male goats' kids. In addition, to study the growth performance and feed efficiency of male goats during the summer season in Egypt.

MATERIALS AND METHODS

A field experiment was carried out at Kerdasa, Giza, Egypt. An area of 0.25 feddan (6 quirats) was used. Soil and water are of saline nature. Artichoke and carrot seeds were obtained from "Field Crops Research Institute", Agricultural Research Center, Giza, Egypt.

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The seeds were sown on rows. The experimental plot was 100 m (length) * 40 m (width). The distance between rows was 50 cm and between plants 25 cm. Yields at harvest were recorded for carrot in the beginning of December 2019 and for artichoke on May 15, 2020. Each part of plant samples was washed with tap water then with distilled water to remove dust-falls, and then dried at 70 ^{O}C. The dry materials were finely ground and kept in polyethylene bags for subsequent analysis.

The experimental animals and rations

Thirty male goats' kids were raised under in Kerdasa the same managerial conditions of eight weeks age (weaning age) until twenty-four weeks age. These kids were divided into 5 groups, immediately after weaning, (males are of 9.4 kg average body weight). They were fed as follows:

• G1 was fed 100% concentrate feed mixture (CFM) feed for growth and maintenance requirements (control group). CFM consisted of 44% yellow corn, 22% wheat bran, 33% groundnut vine, 1% salt.

• G2 was fed 100% saline artichoke waste feed (SAWF) for growth and maintenance.

• G3 was fed 100% saline carrots waste feed (SCWF) for t growth and maintenance.

• G4 was fed 50% (CFM) plus, 50% (SAWF) for growth and maintenance.

•G5 was fed 50% (CFM) plus 50% (SCWF) for growth and maintenance.

The average starting weights of the experimental kids in the experiment were 9.5, 9.5, 9.4, 9.4 and 9.43 kg for G1, G2, G3, G4 and G5 male goats, respectively. The feed intake (FI) for each animal was recorded every two weeks for three consecutive days. Rated residues (if any) were recorded for each group. Chemical compositions of feed stuffs are presented in Table (1).

Digestibility trials: Digestibility trials were performed for all the experimental growing male goats (GMG) using a grab sample method where acid insoluble ash (AIA) was used as an internal marker according to Schneider and Flatt (1975) to determine the nutrients digestibility coefficient (NDC).

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Blood sampling: Blood samples (10 cm) were collected monthly from the Jugular vein before feeding and watering of all goat kids. Samples were collected into clean dried tubes with EDTA. Plasma samples were obtained by centrifuging blood at 4000 (rpm) for 15 minutes, for determination of the selected biochemical traits (Feldman *et al*., 2002)**.**

Blood parameters such as hemoglobin (Hb), hematocrit (HCT), red blood cells count (RECs and white blood cells count (WBCs) were measured in different breeds of goats according to (Feldman et al., 2002). Blood plasma was analyzed in fresh blood for Total protein (TP) (Armstrong and Carr, 1964), albumin (Alb) (Doumas et al., 1971**)**, urea bilirubin (Bu) (March, 1965), creatinine (Cr) **(**Husdan and Rapoport 1968**)**, AST and ALT (Reitman and Frankel, 1957), cholesterol (Trinder, 1969) and triglyceride (TG) (Fassati and Prencipe, 1982), Globulin (Glb) was calculated by the difference between (TP) and (Alb). Serum biochemistry values of different goat breeds, (AST), (ALT), alanine aminotransferase, Creatinine (Cr), Albumin (Alb), Cholesterol Triglycerides (TG) were measured according to Latimer et al. (2011); Opara et al., (2010); Adedeji; (1992) and Mishra (2013).

Growth performance parameters

The individual live body weights were measured every two weeks. The individual average daily body weight gain was computed. The daily feed intake for each treatment replicate was calculated by subtracting the daily leftover feed from the daily given feed. The feed conversion ratios were derived by dividing the feed amount consumed by each calf by the corresponding weight gain in a specific stage (two weeks) (Latimer et al., 2011; Opara *et al.*, 2010; Adedeji, 1992; Mishra, 2013).

Feed analysis:

Samples of feedstuffs and faces were analyzed for its chemical composition according to A.O.A.C (1995) procedures to determine moisture, dry matter (DM), organic matter (OM), crude protein (CP), crude fiber (CF), ether extract (EE), ash contents, and nitrogen free extract (NFE).

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Statistical analysis:

Data obtained were statistically analyzed using SAS (2001). Separation among means were detected by using Duncan multiple tests (1955).

RESULTS AND DISCUSSION

Soil and ground water analyses

The chemical and physical properties of soil and under groundwater samples were determined.

Soil analyses

Results of soil analyses in Table (1) was carried out before planting experiment on roots zone on three depth 0-15, 15-30, 30-45 Cm and Measurements 7.75,7.88 ,7.73 pH, saline EC were 21.87,9.80, 9.98 (dS/m), Cations were 2793.35, 161.82,104,22 (mEq/L), Anions were 1440.65, 102.45, 109.14 (mEq/l) and Sodium adsorption rate in the soil pulp extract was 1.96 (SAR)

Table 1: Chemical properties of studied soil samples.

DEPTH CM	PH	EC (DS/M)	CATIONS (MEQ/L)				ANIONS (MEQ/L)				SAR
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$	HCO_3^{-}	Cl^{-}	$SO_4^{=}$	
0-15	7.75	21.87	767.56	585.14	87.21	0.74	---	4.40	168.00	1268.25	1.96
15-30	7.88	9.80	32.43	26.94	42.75	0.33	----	4.00	60.00	38.45	
30-45	7.73	9.98	2.43	64.69	7.52	0.30	----	4.40	65.00	39.74	

The soil composed mainly of coarse sand, fine sand, silt and clay. There was a homogeneity in the physical properties of studied soil samples at the three depths: 0-15, 15-30, 30-45 cm. Results showed that the most common soil physical properties were clay at the three depths representing 49.3%,41.35%,44.38 % respectively. The least soil component was coarse sand at the three depths representing 5.8%,6.35%,6.34 % (Table 2).

Table 2. Physical properties of studied soil samples.

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DEPTH (CM)	PHYSICAL PROPERTIES (%)			
	Coarse sand	Fine sand	Silt	Clay
0-15	5.8	14.8	30.1	49.3
15-30	6.35	14.15	38.15	41.35
30-45	6.34	14.16	38.12	41.38

Chemical analysis of ground water

Table (3) showed that average Chemical analysis of ground water Examination of the chemical analysis of the tested ground water indicated that pH values is within the permissible levels suggested by Ayers & Westcot (1985) and Landon (1991), who referred that pH must be in range of 6.5 – 8.5. The increase of the pH value higher than 8.4 leads to tendency to dissolve lime from soil through which the water moves, which may cause imbalance in nutrient uptake.

The detected values of EC (3.17ds/m) classify the tested water sample as high salinity water as mentioned by Ayers & Westcot (1985) and Landon (1991), who recorded that the water which have (EC from 0.7 – 1500 dsm^{-1}) total dissolved salts range from 500- 1500 ppm is classified as high salinity water. The high salinity of water could not be used on soil with restricted drainage. Even with adequate drainage, special management for salinity control may be required and plants with good tolerance should be selected.

The detected values of HCO- were in the range of 1.5- 8.5 mgL^{-1}, as mentioned by Ayers & Westcot (1985) and Landon (1991). Hence the quality of water samples are slight to moderate degree of restriction on use CO= was not detected, and there was no residual carbonate in the tested water.

The calculated sodium adsorption ratio (SAR)value of the tested water was under 10 , as mentioned by Ayers & Westcot (1985) and Landon (1991), showing that the water is low sodium so it can be used for irrigation on almost all soils with little risk of the development of harmful level of exchangeable sodium

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Table 3. Chemical analysis of ground water

PH	EC (DS/M)	CATIONS (MEQ/L)				ANIONS (MEQ/L)				SAR
		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO_3^{=}$	HCO_3^{-}	Cl^{-}	$SO_4^{=}$	
7.8	3.17	12.21	13.02	7.98	0.38	---	5.60	15.15	11.74	1.93

Feed Analyses

Feed analyses for **100**-gram dryer from Concentrate feed mixture (CFM) feed, Carrot waste and Artichoke waste for the CFM had highest values of NFE and the lowest ones of om and CF. In addition, it had the lowest values of CP, EE, NFC and ash. on the other hand, the sar had the highest values of DM, CP, EE and ash compared to the other two types of feeds in Table (4).

Table 4. Chemical composition of feed stuffs (% on dry matter basis DM).

100-GRAM DRYER	DM	OM	CF	CP	EE	NFE	ASH
Concentrate feed mixture (CFM) feed	89.7	77.59	10.28	15.00	2.16	50.15	12.11
Carrot waste	10.1	91.8	27.48	9.9	1.4	37.24	8.2
Artichoke waste	92.30	87.34	24.22	16.61	5.46	41.05	12.66

dm: dry matter, **om**: organic matter, **cf**: crude fiber, **cp**: crude protein, **ee**: ether extract and **nfe:** nitrogen free extract,

Dry matter intake

Results in Table (5) indicated that the highest significant value ($p \leq 0.05$) of dry matter intake (DMI) was recorded for group G3 followed by G2, G5, G5 then G1. The average of DMI over the entire period of experiment was insignificant, in which the lowest value was recorded in the first period in G4 (386±07g/h/day), while the highest value was recorded in the ninth and last period in G3 (929±14g/h/day). These results are in agreement with those obtained by Osman (2003)**.** Results indicated that there were insignificant differences among the studied groups.

Table (5): Effect of feed type on dry matter intake (g/h/d) by different groups

EXPERIMENTAL PERIODS	TREATMENTS				
	G1	G2	G3	G4	G5
0 – 15	392±08	586±10	629±10	386±07	400±08
16 – 30	418±10	593±10	643±10	414±09	421±08
31 – 45	452±09	600±11	657±11	429±09	464±09
46 – 60	496±11	629±13	686±09	464±10	514±10
61 – 75	541±10	643±14	729±10	500±11	557±10
76 – 90	584±12	686±14	771±13	557±10	600±11
91 – 105	632±14	714±18	829±12	600±11	657±12
106 – 120	709±15	757±17	886±14	643±12	743±13
121 – 135	754±14	786±13	929±14	686±12	786±14
Overall mean	553^{b}	666^{ab}	751^{a}	520^{c}	571^{b}

a, b and c mean of treatments within the same row with different superscript letters are significantly different ($p \leq 0.05$).

Results showed that average daily gain (kg/h/day) of G1 recorded the highest value

Nutrients digestibility

The effect of the feed type on the NDC of the growing animals during the whole experiment period was clearly shown in Table (6). The highest digestibility values of DM, OM, CP, and EE were recorded by G1; and the NFE values for G5 followed by G2, G4, G5 and then G3. These results are consistent with Estrada-Angulo (2021). Sallam et al. (2008) stated that Artichoke by-product was an excellent alternative feedstuff for ruminants, comparable to any conventional feed such as alfalfa hay. Hindrichsen et al. (2006) stated that artichoke rations had the highest digestibility values of OM and CP compared with the many other by-products diets.

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Table 6. Effect of feed type on the nutrient's digestibility coefficient

DIET	TREATMENTS				
	G1	G2	G3	G4	G5
DM	72.2a±1.14	70.5ab±1.87	61.5c±1.92	66.8b±1.52	64.7b±2.17
OM	74.0a±1.35	71.3ab±1.39	64.2c±2.24	69.5b±1.89	68.4b±2.49
CP	76.8a±2.45	72.3b±2.36	67.3c±2.47	71.6b±1.82	72.9b±2.52
CF	65.2±1.41	62.3±1.34	58.4±1.26	61.3±1.57	61.5±1.62
EE	79.4a±2.03	78.5a±2.29	68.5c±1.84	74.5ab±2.37	73.5b±2.61
NFE	83.3a±2.67	82.2a±2.52b	72.3c±2.06	77.6b±2.43	76.3b±2.89

a, b & c means of treatments within the same row with different superscript letters are differ significantly ($p \leq 0.05$). **dm**: dry matter, **om**: organic matter, **cf**: crude fiber, **cp**: crude protein, **ee**: ether extract and **nfe:** nitrogen free extract,

Results indicated that the feed type in G2 and G4 enhanced the overall digestion of nutrients, especially for goats fed a high-energy diet**.** Arabi et al. (2020) reported that feeding for a period of 135 days on different doses of saline fed as percentage in five Group the nutrients digestibility coefficient of the goats was recorded for G1, followed by G2, G4, G5, and then G3. Regarding the comparison among the treated groups, G2 showed the higher values of (NDC) than that of other groups. However, all groups showed lower values either significant or insignificant, especially G3 that gave the lowest values, compared the control group G1. Comparison among groups revealed that, G2 showed high values of (OM, CF, EE and NFE) compared to other groups. However, all groups showed lower values compared to control group G1. G2 showed the higher values of (CP) than that of other groups. Because CFM had the highest value of NFE and the lowest ones of OM and CF. On the other hand, the SAR had the highest values of DM,.CP, EE and Ash. compared to the other two types (SAF) and (SCF) of feeds in Table (4)

Blood plasma: Results in Table (7) showed the effect of feed type on blood parameters as TP, Alb, Glb, Bu, Cr, TG, TC, ALT and AST. G1 TP recorded the highest value in comparison to other groups followed by G2, G5, G3, G4 which recorded the lowest with normal average 6.0-6.98 g/dl**).** Armstrong and Carr (1964) performed an experiment on the

chemical composition, digestibility coefficients, cell wall constituents, nutritional value, and productive performance of growing Rahmani lambs using non-conventional energy sources. For 120 days, twelve Rahmani lambs, 4 months old, with an average body weight of 22.60±0.20 kg, were employed in this study. Two comparable groups of six lambs each were created, and the lambs were then randomly assigned to one of two experimental rations. 60% concentrate feed mixture (CFM) and 40% rice straws (RS) were the contents of the two corresponding rations that made up R1 (control). In contrast, R2 was made up of 5% corn steep liquor (CSL), 40% RS, and 55% CFM. Utilizing six adult Rahmani rams, the digestibility and nutritional values of experimental rations were ascertained. Blood samples and rumen liquor were taken at the conclusion of the collection period.

The results showed that nutrient digestibility and feeding values were higher (p<0.05) for rations R2. Alb in G4 recorded the highest significant value and then G1, G2, G5, G3 which recorded the lowest with normal average (3.35-3.76 g/dl). Doumas et. al (1971) showed that A rapid and reliable method for measuring serum albumin and A protein standard is introduced which can be employed for both the total serum proteins and albumin determinations. Glb in G1 recorded the highest significant value followed by G2, G5, G3, G4 that recorded the lowest. Bu in G2 recorded the highest significant value followed by G2, G3, G1, G4 that recorded the lowest with normal range (1.2 – 1.9 mg/dl) .

G5 Cr recorded the highest value followed by G3, G5, G1. G1 recorded the lowest with normal range (25-60 mg/dl) (Husdan and Rapoport 1968). TG was G1 recorded the highest significant value followed by G2, G4, G3, G5 that recorded the lowest with normal average (170 m g/dl). (TC) was G5 recorded the highest significant value followed by G4, G1, G2, G4 that recorded the lowest with normal average (30-110 mg/dl). (ALT) was in G2 recorded the highest significant value followed by G3, G5, G1, G4 that recorded the lowest with range (95 U/L)**.** (AST) wasG2 recorded the highest significant value followed by G5, G3, (G1, G4) that recorded the lowest with normal range (98 U/L) (Opara et al., (2010); Adedeji (1992); Mishra (2013). Moreover, the effect of the experimental treatments on blood parameters WBCs (10^3/mm^3). RBCs (10^6/mm^3), HCT %, Hb (g/dl) and (T) (ng / ml).

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Results recorded Groups as the following in WBCs was G2 recorded the highest significant value and then G3, G5, G4and G1 that recorded the lowest with normal range (6 ×10 3 – 16 ×10 3 /mm^3).G2 recorded the highest significant value of RBCs and then G4, G5, G3 and G1 that recorded the lowest with normal range (8 – 17.5 million/c. mm).in HCT was in G4 recorded the highest significant value followed by G2and G1, G3, G5 that recorded the lowest with normal range (18- 38 %) . (G1, G2 recorded the highest significant value of Hb followed by G4, G5. G3 that recorded the lowest with normal range (8 – 14 g/dl).(T) was in G2 recorded the highest significant value followed by G4, G5, G3and G1that recorded the lowest with normal range (10.27 – 18 .51 ng / ml) (Feldman, 2002) . In conclusion our results showed that the best group was G1 followed by G2, G4, G5 and G3. Despite some effects of the experimental treatments on some blood parameters values were high but within recommended limits. The biochemical and hematological variables of blood can be used to monitor and or evaluate health, nutritional and physiological status of ruminants (Al-Eissa *et al.,* 2012).

Table (7). Effect of feed type on some blood parameters

BLOOD	FEED TYPE				
	G1	G2	G3	G4	G5
Blood parameters					
Total protein (g /dl)	6.72	6.63	6.12	6.57	6.48
Albumin (g /dl)	3.54	3.48	3.08	3.62	3.34
Globulin (g /dl)	3.18	3.15	3.04	2.95	3.14
Urea (mg /dl)	41.18	47.29	46.50	42.75	45.37
Creatinine (mg /dl)	1.40^b	1.55	1.45	1.30	1.65
Cholesterol (mg/dl)	115.08	107.46	98.27	105.42	86.53
Triglyceride (mg/dl)	78.52	76.43	68.54	98.47	102.19
Blood enzymes					
ALT (unit /L)	44.83^b	56.24	51.50	42.78	49.51
AST (unit /L)	40.50^{ab}	56.50	48.50	40.50	48.67
Hematological parameters					
WBCs (10^3/mm^3)	11.65	15.20	13.67	13.55	13.65
RBCs (10^6/mm^3)	11.25	14.60	13.75	14.45	13.90
HCT (%)	36.50	37.50	34.95	37.75	34.00
Hb (g/dl)	13.50	13.50	12.25	13.25	12.40
Testosterone (ng / ml)	13.50	14.80	13.80	14.40	13.85

a, b and c means of treatments within the same row with different superscript letters are significantly different ($p \leq 0.05$).

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Body weights and average daily gain

Results in Table (8) showed changes of (BW). Results showed that conducted an experiment on five groups with a total of 30 male goats with an average initial weight of 9.4 kg (G1) 9.5±0.4kg (G2) 9.4±0.33kg (G3) 9.4±0.33kg (G4)9.4±0.28kg.(G5) 9.3±0.24 kg in order to evaluate usage saline vegetables (SAF) and (SCF) Final weight Kg (G1),23.5±1.3 kg, (G2) 21.23± 1.13kg, (G3) 18.73±0.87kg, (G4) 20.5±0.96kg, (G5) 19.9±0.92. Moreover, changes of daily gain (kg/h/d). G1(**0.115**) feed recorded the highest significant value G2 (0.097), G4(**0.090**). G5 (**0.086**) and G3(0.075) that recorded the lowest ensilage of Artichoke by-products remaining after industrial processing is an economical and environmentally friendly way to decrease waste discharges and reduce the management cost. Meneses et al. (2007) reported that these by-products had a good silage quality, a pleasant smell, a crude protein content of 88 g/kg dry matter, and a fiber content of 509 g/kg dry matter, making them suitable for ensiling. Because of the gradual increase in body weight, such silage can be used in ruminant feeding, taking the place of traditional roughage sources like hay (Gasa *et al.,* 1989; Sallam *et al.,* 2008). The results are in agreement with those obtained by Osman (2003).

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Table (8). Effect of the experimental treatment on changes of body weights and daily gain (kg/h/d)

PARAMETER	TREATMENTS				
	G1	**G2**	**G3**	**G4**	**G5**
Animal weight					
Initial weight (Kg)	9.5±0.37	9.5±0.33	9.45±0.33	9.4±0.28	9.3±0.24
Final weight (Kg)	23.5±1.28	21.2± 1.12	18.7±0.87	20.5±0.96	19.9±0.92
Total gain (Kg)	14.09±0.61^{a}	11.8±0.40 ^{ab}	9.3±0.36^{c}	11.1±0.42^{ab}	10.6±0.35^{b}
days	Average daily gain (kg/h/day)				
0 – 15	0.091±0.03	0.083±0.02	0.056±0.01	0.070±0.02	0.064±0.02
16 - 30	0.099±0.02	0.086±0.02	0.059±0.01	0.073±0.02	0.068±0.02
31 – 45	0.090±0.02	0.084±0.02	0.075±0.02	0.089±0.03	0.084±0.03
46 – 60	0.101±0.06	0.085±0.04	0.060±0.02	0.083±0.02	0.068±0.02
61 – 75	0.102±0.03	0.093±0.04	0.072±0.02	0.077±0.02	0.093±0.03
76 – 90	0.132±0.02	0.101±0.05	0.074±0.02	0.069±0.02	0.079±0.03
91 – 105	0.129±0.04	0.107±0.06	0.089±0.03	0.126±0.04	0.121±0.04
106 – 120	0.137±0.03	0.110±0.05	0.088±0.03	0.112±0.04	0.096±0.03
121 – 135	0.144±0.05	0.119±0.06	0.105±0.05	0.104±0.03	0.102±0.04
Average	0.115^{a}	0.097^{ab}	0.075^{c}	0.090^{b}	0.086^{b}

a, b and c means of treatments within the same row with different superscript letters are significantly different ($p \leq 0.05$) g1 was fed 100% (cfm) (control group), g2 was fed 100% (saf), g3 was fed 100 (scf), g4 was fed 50% (cfm) plus, 50% (saf)and g5 was fed 50% (cfm) feed and, 50% (scf).

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Dry matter conversion

Table (9) showed the effect of experimental treatments on dry matter conversion (kg DM/ kg gain). Results showed that the Average Overall mean DMC was the G3(10.20) recorded the highest significant value and followed by G2, (7.41) G5(7.11), G4 (6.07) and G1 (4.85) that recorded the lowest recorded resulted in (DMC) this results average for 9 period (135 days).

Table (9): Effect of the experimental treatments on dry matter conversion (DMC) (kg DM/ kg gain).

DAYS	TREATMENTS				
	G1	G2	G3	G4	G5
0 – 15	4.10±0.17	6.80±0.27	11.32±0.38	5.52±0.17	6.24±0.19
16 – 30	4.37±0.18	6.88±0.28	11.57±0.39	5.93±0.20	6.57±0.18
31 – 45	5.11±0.21	7.20±0.24	9.40±0.28	4.81±0.18	5.86±0.14
46 – 60	4.88±0.17	9.10±0.32	9.65±0.27	5.85±0.23	7.59±0.26
61 – 75	5.34±0.22	7.06±0.22	10.21±0.28	6.66±0.24	6.84±0.22
76 – 90	4.30±0.18	8.90±0.29	10.42±0.30	6.95±0.25	7.56±0.26
91 – 105	5.04±0.20	6.87±0.17	9.84±0.29	5.49±0.17	6.40±0.19
106 – 120	5.23±0.18	6.99±0.18	10.13±0.31	6.31±0.21	8.69±0.28
121 – 135	5.31±0.22	6.84±0.18	9.23±0.26	7.11±0.24	8.23±0.25
Overall mean	4.85c	7.41b	10.20a	6.07b	7.11b

a, b and c mean of treatments within the same row with different superscript letters are significantly different ($p \leq 0.05$)

CONCLUSION

In conclusion, the best group G1 was fed 100% (CFM) (control group), followed by G2 which was fed 100% (SAF), followed by G4 which was fed 50% (CFM) and 50% (SAF), followed by G5 which was fed 50% (CFM) feed and 50% (SCF) followed by G3 which was fed 100 (SCF). This was due to the highest DMC and The CFM had highest values of NFE

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and the lowest ones of OM and CF. In addition, it had the lowest values of CP, EE, NFC and Ash. On the other hand, the SAR had the highest values of DM, CP, EE, and Ash compared to the groups of feeds. Despite some effects of experimental treatments on some blood parameters were high but were within the recommended limits due to the gradual increase in body weight. Chemical composition, digestibility and growth performance of Artichoke by-products proved to be excellent unconventional feedstuffs as a roughage for ruminants, equivalent to any conventional roughage feeds like bean straw. This study suggested that, Artichoke have potential efficiency and could be incorporated in feed mixtures to replace conventional roughage sources (e.g., hay and silage) in ruminant diets without any problem.

REFERENCES

Adedeji A.O. 1st ed. S. Asekome, and Co.; Samaru, Zaria, Nigeria: 1992. Rapid interpretation of routine clinical laboratory tests; pp. 10–16.

AOAC (1995) Official Methods of Analysis. 15th Edition, Association of Official Analytical Chemists, Washington DC

Al-Eissa, M. S., Alkahtani, S., Al-Farraj, S. A., Alarifi, S. A., Al-Dahmash, B., & Al-Yahya, H. (2012). Seasonal variation effects on the composition of blood in Nubian ibex (Capra nubiana) in Saudi Arabia. *African Journal of Biotechnology*, *11*(5), 1283-1286.

Arabi Tabaghdeh, R., Bahari, M., & Sadeghi, M. (2020). The effect of different levels of Biomin® IMBO synbiotic supplement in diet on growth performance, apparent digestibility nutrients and some blood parameters fattening Zell lambs. *Journal of Ruminant Research, 8*(3), 13-28.

Armstrong, W. D and Carr.C.W., (1964). Physiological chemistry 3rd ed. P, 75. Burges Publishing Co. Minneapolis, Minnesota.

Ayers, R. S., & Westcot, D. W. (1985). Water quality for agriculture, FAO Irrigation and Drainage paper No. 29, Rome. *Simsek, C. and Gunduz, O.(2007). IWQ index: AGIS integrated technique to assess irrigation water quality. Environ. Monit. Assess, 128,* 277-300.

Banerjee, G. C. (1998). Feeding and Principles of Animal Nutrition. Oxford and IBH Publishing Co Pvt Ltd., New Delhi. India.

CAPMAS. (2010). Central Agency for Public Mobilization and Statistics. Statistical Yearbook Available at: www.capmas. gov. eg.

Correddu, F., Nudda, A., Battacone, G., Boe, R., Francesconi, A. H. D., & Pulina, G. (2015). Effects of grape seed supplementation, alone or associated with linseed, on ruminal metabolism in Sarda dairy sheep. *Animal feed science and technology*, *199*, 61-72.

Doumas, B. L., Watson, T., & Biggs, T. (1971). Albumin standards and measurement of serum with bromocresol green. vol. 31. *Clin Chem Acta*, 90365-2.

Duncan, D. B. (1955). Multiple range and multiple F tests. *biometrics*, *11*(1), 1-42.

Estrada-Angulo, A., Zapata-Ramírez, O., Castro-Pérez, B.I., Urías-Estrada, J.D., Gaxiola-Camacho, S., Angulo-Montoya, C., Ríos-Rincón, F.G., Barreras, A., Zinn, R.A., Leyva-Morales, J.B. and Perea-Domínguez, X. (2021). The effects of single or combined supplementation of probiotics and prebiotics on growth performance, dietary energetics, carcass traits, and visceral mass in lambs finished under subtropical climate conditions. *Biology*, *10*(11), p.1137.

Fassati, P., & Prencipe, L. (1982). Serum triglycerides determined calorimetrically with an enzyme that produces hydrogen peroxide. *Clin Chem*, *28*(10), 2077-2080.

Feldman, B.F., Zinkl, J.G. and Jain, N.C. (2000) Schalm's Veterinary Hematology. 5th Edition, Lippincott Williams & Wilkins

Gasa, J., Castrillo, C., Baucells, M. D., & Guada, J. A. (1989). By-products from the canning industry as feedstuff for ruminants: digestibility and its prediction from chemical composition and laboratory bioassays. *Animal Feed Science and Technology*, *25*(1-2), 67-77.

Goneim, G. A., Ibrahim, F. Y., & El-Shehawy, S. M. (2011). Carrot leaves: antioxidative and nutritive values. *Journal of Food and Dairy Sciences*, *2*(4), 201-211.

Hindrichsen, I. K., Wettstein, H. R., Machmüller, A., Knudsen, K. B., Madsen, J., & Kreuzer, M. (2006). Digestive and metabolic utilization of dairy cows supplemented with concentrates characterised by different carbohydrates. *Animal Feed Science and Technology*, *126*(1-2), 43-61.

Husdan, H., & Rapoport, K. (1968). Chemical determination of creatinine with deproteinization. *Clin Chem*, *14*(3), 222-238.

Landon, J. R. (1990). Booker Tropical Soil Manual. Booker Agricultural International Limited.

Latimer, K. S. (Ed.). (2011). *Duncan and Prasse's veterinary laboratory medicine: clinical pathology*. John Wiley & Sons.

Larzul, C., & De Rochambeau, H. (2005). Selection for residual feed consumption in the rabbit. *Livestock Production Science*, *95*(1-2), 67-72.

March, W. (1965). Determination of urea by diacetylmonoxime method. clin. *Chem*, *11*(624), 967-973.

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Meneses, M., Megías, M. D., Madrid, J., Martínez-Teruel, A., Hernández, F., & Oliva, J. (2007). Evaluation of the phytosanitary, fermentative and nutritive characteristics of the silage made from crude artichoke (Cynara scolymus L.) by-product feeding for ruminants. Small Ruminant Research, 70(2-3), 292-296.

Merek (1991). The Merek Veterinary Manual. 7th Ed.

Mishra, D. K., Naik, S. N., Srivastava, V. K., & Prasad, R. (1999). Effect of drying Matricaria chamomilla flowers on chemical composition of essential oil. *J Med Aromat Plant Sci*, *21*(4), 1020-1025.

Mishra, A., Chatterjee, U. S., & Mandal, T. K. (2013). Induction of chronic renal failure in goats using cisplatin: A new animal model. *Toxicology International*, *20*(1), 56.

Miller, J. E., (2003). Review of Water Resources and Desalination Technologies, Sandia Nat. Lab.: 6:20-23.

National Research Council. (1985). *Nutrient requirements of sheep* (Vol. 5). National Academies Press.

Opara, M. N., Udevi, N., & Okoli, I. C. (2010). Hematological parameters and blood chemistry of apparently healthy West African Dwarf (Wad) goats in Owerri, South Eastern Nigeria. *New York Science Journal*, *3*(8), 68-72.

Osman, A. (2003). Studies on the feeding value of green fodder from jerusalem artichoke (Helianthus tuberosus L.). *Journal of Animal and Poultry Production*, *28*(7), 5277-5282.

Razzaghi, A., Naserian, A. A., Valizadeh, R., Ebrahimi, S. H., Khorrami, B., Malekkhahi, M., & Khiaosa-Ard, R. (2015). Pomegranate seed pulp, pistachio hulls, and tomato pomace as replacement of wheat bran increased milk conjugated linoleic acid concentrations without adverse effects on ruminal fermentation and performance of Saanen dairy goats. Animal Feed Science and Technology, 210, 46-55.

Reitman, S., & Frankel, S. (1957). A colorimetric method for the determination of serum glutamic oxalacetic and glutamic pyruvic transaminases. *American journal of clinical pathology*, *28*(1), 56-63.

Salami, S. A., Luciano, G., O'Grady, M. N., Biondi, L., Newbold, C. J., Kerry, J. P., & Priolo, A. (2019). Sustainability of feeding plant by-products: A review of the implications for ruminant meat production. Animal Feed Science and Technology, 251, 37-55.

Sallam, S.M.A.; Bueno, I.C.S.; Godoy, P.B; Nozella, E.F.; Vitti, D.M.S. and Abdalla, A.L. (2008). Nutritive value assessment of the Artichoke (Cynara scolymus) by-product as an alternative feed resource for ruminants. Trop. Subtrop. Agro ecosystems, 8: 181-189.

Salman, F. M., El-Nomeary, Y. A. A., Abedo, A. A., Abd El-Rahman, H. H., Mohamed, M. I., & Ahmed, S. M. (2014). Utilization of artichoke (Cynara scolymus) by-products in sheep feeding. *Am. Eurasian J. Agric. Environ. Sci*, *14*, 624-630.

SAS, (2001). Statistical Analysis System guide: Version 8.2th. Institute Inc. Cary. Nc. USA.

Schneider, B. H., & Flatt, W. P. (1975). *The evaluation of feeds through digestibility experiments*. University of Georgia Press, Athens 30-60.

Trinder, P. (1969). A simple Turbidimetric method for the determination of serum cholesterol. *Annals of Clinical Biochemistry*, *6*(5), 165-166.

Zapata, O., Cervantes, A., Barreras, A., Monge-Navarro, F., González-Vizcarra, V. M., Estrada-Angulo, A., ... & Plascencia, A. (2021). Effects of single or combined supplementation of probiotics and prebiotics on ruminal fermentation, ruminal bacteria and total tract digestion in lambs. *Small Ruminant Research*, *204*, 106538.

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تأثير تغذية بعض مخلفات الخضروات المقاومة للملوحة على أداء النمو والكفاءة الغذائية لذكور الماعز النامية

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المستخلص

نظراً لارتفاع أسعار الأعلاف يتجه المربون إلى استخدام بدائل ومنها مخلفات النباتات المقاومة للملوحة. وهدفت التجربة إلى دراسة تأثير استخدام مخلفات الخضروات المقاومة للملوحة في علائق الماعز، على الأداء الإنتاجي وكفاءة التمثيل الغذائي للماعز النامية خلال فترة التجربة ولذلك تم إجراء تجربتين ميدانيتين في مزرعة كرادسة في الجيزة، مصر، خلال الموسم صيف 2019 موسم، تم تربية ثلاثين من ذكور ماعز بلدي في الفترة من الأسبوع الثامن حتى الأسبوع الرابع والعشرين، وتلقت جميع الماعز نفس المعاملة في هذه الفترة "الرضاعة الطبيعية". تم تقسيم المجموعات بعد الفطام مباشرة وكان متوسط أوزان 9.4 كجم وتم التقسيم بشكل عشوائي إلى خمس مجموعات متساوية (6 حيوانات لكل مجموعة) وهي: المجموعة الأولى الضابطة على نظام غذائي أساسي وفقا لنظام تغذية المزرعة بنسبة 100٪ من العلف المركز (متطلبات النمو والرعاية) ، المجموعة الثانية بنسبة 100 ٪ من علف الخرشوف الملحي، المجموعة الثالثة بنسبة 100٪ من علف الجزر المالح، المجموعة الرابعة بنسبة 50 ٪ من العلف المركز، و50 ٪ من علف الخرشوف الملحي، المجموعة الخامسة بنسبة 50 ٪ من العلف المركز، و50 ٪ من علف الجزر الملحي. وأظهرت النتائج أن أعلى قيمة معنوية للمادة الجافة على التوالي سجلت للمجموعة الثالثة، تليها المجموعة الثانية ثم الخامسة ثم الأولى ثم الرابعة. وقيمة أعلى غير معنوية لتحويل المادة الجافة تم تسجيله للمجموعة الثالثة .وتم تسجيل أعلى قيم معنوية للتغيرات في أوزان الجسم اليومية للمجموعة الأولى، تليها المجموعة الثانية والرابعة والخامسة ثم أعلى قيم معنوية المادة الجافة، المادة العضوية، الأثير المستخلص، مستخلص خالي النتروجين على معامل هضم العناصر الغذائية. تم تسجيل الماعز خلال فترة التجربة بأكملها بان للمجموعة الأولى، تليها المجموعة الثانية والرابعة والخامسة ثم المجموعة الثالثة. وأعلى قيم معنوية الألياف الخام على معامل هضم العناصر الغذائية للماعز خلال فترة التجربة بأكملها كانت المجموعة الأولى والخامسة، والثانية، والرابعة، والثالثة. كما تلاحظ أعلى قيم معنوية البروتين الخام على معامل هضم العناصر الغذائية للماعز خلال فترة التجربة بأكملها في المجموعة الأولى والثانية، والخامسة، والرابعة، والثالثة. وكانت هناك فروق معنوية في بعض صفات الدم في البروتين الكلي، الألبومين، الجلوبيولين واليوريا والكرياتينين والاختلافات الطفيفة في قياسات الدم البروتين الكلي والألبومين والجلوبيولين واليوريا والكرياتينين والكوليسترول والدهون الثلاثية وإنزيمات الكبد الناقلة لمجموعات الأمين واختلافات طفيفة في الدم خصائص كريات الدم البيضاء، كرات الدم الحمراء، الهيماتوكريت، الهيموجلوبين وهرمون التستوستيرون. فيما يتعلق بأداء النمو وكفاءة التحويل الغذائي، سجل العلف المركز 100 % أعلى قيمة معنوية، ثم المجموعة الثانية التي تمت تغذيتها بنسبة 100٪ من الخرشوف الملحي، والمجموعة الرابعة تمت تغذيتها بنسبة 50٪ من العلف المركز، و50٪ من الخرشوف الملحي للمجموعة الخامسة كانت تغذية 50٪ علف مركز، 50٪ علف جزر ملحي. أما المجموعة الثالثة فقد تم تغذيتها بنسبة 100٪ على علف جزر ملحي والتي سجلت أدنى قيم. واستنتجت الدراسة أن أفضل مجموعة كانت المجموعة الأولى ثم الثانية والرابعة والخامسة والثالثة وعلى الرغم من أن بعض المعاملات التجريبية كانت عالية في بعض معاملات الدم، ولكن في الحدود الموصي بها مما يفيد في توفير العلائق المنتجة من المخلفات الزراعية المنزعة في أراضي ملحية والمروية كذلك بمياه ملحية مما يؤثر على العائد الاقتصادي لتربية الماعز.

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