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Effect of Using Different Levels of Dried Taro (*Colocasia esculanta*) Waste without or with Dried Yeast (*Saccharomyces cerevisiae*) on Growth Performance of Growing Lambs.

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ABSTRACT

This study was conducted to investigate the effect of inclusion dried taro waste (DTW) without or with dried yeast (DY) in sheep rations on digestibility, rumen fermentation activity, blood parameters and growth performance of Ossimi lambs. Comparative feeding trial was applied with twenty four growing male lambs, averaging 21.5±2 kg of body weight where they were randomly divided into four similar groups (6 each) for feeding period of 150 days. The experimental rations were formulated as followed: 65% CFM+17.5% rice straw (RS) +17.5% DTW (R1); 65% CFM+17.5% RS+17.5% DTW with dried yeast (R2); 65% CFM+35% DTW (R3) and 65% CFM+35% DTW with dried yeast (R4). Dried yeast (*Saccharomyces cerevisiae*) was added at the rate of 5g/h/d. Digestibility trials were conducted with Ossimi rams to evaluate the digestibility and feeding values of the experimental rations. Results indicated that most nutrient digestibilities were markedly improved with the higher level of DTW in rations, where R3 and R4 had the highest ($P<0.05$) digestibility values for most nutrients versus those of the lower DTW ration, without or with DY (R1& R1). Feeding values expressed as TDN did not significantly differ among the experimental rations, while DCP values were significantly improved with increasing the level of DTW, without or with DY. Addition of DY to R2 and R4 rations had no significant effect on feeding values expressed as TDN and DCP. Results of rumen liquor pH values were almost insignificant increased with increasing the proportion of DTW in rations without or with DY. Also, there were no significant differences in NH_3-N and TVFA´s concentrations among the experimental groups, with the best values being occurred with the low level of DTW-ration with DY additive (R2). No significant differences were observed among experimental groups concerning the all blood parameters except for albumin that was significant higher for animals fed ration contained only DTW with yeast (R4), while the differences respecting this item did not significant among the other treatments. Average daily gain was significantly higher with tested ration R2 than that of R3 or R4, but insignificant higher than that of R1-ration. Daily DM intake was nearly comparable among groups. The best values of feed conversion and economic efficiency were observed with lambs fed ration that contained DTW + RS + DY (R2) while; these items did not improve with increasing DTW level. It could be concluded that DTW is a nutritious fodder ingredient for ration formulation for small ruminant. Therefore the low level of DTW (17.5%) especially with yeast is highly recommended in practical feeding of growing lambs.

Keywords: Dried taro waste, dried yeast, sheep, digestibility, ruminal parameters, growth performance, blood parameters

INTRODUCTION

Livestock plays a very important role as an integral part of farming and rural life in developing countries; providing food and income for many farmers. The shortage of feeds to meet the nutritional requirements of the existing animal population is one of the most critical problems of animal production in Egypt. Minimizing the feed cost could be achieved through the use of untraditional cheaper feed ingredients or by using some feed additives to improve utilization of common feeds. Most vegetable residues are beneficially used as organic fertilizers or burned and severely causing an environmental pollution, but some are dried and stored as forage sources for ruminants or they may be grazing by livestock in the field (Renard, 2001). These residues, which producing by huge amounts are considerably a potential supply of manipulated feeds for feeding animals in Egypt and the most developing countries. Vegetables vines are the cheapest sources of essential amino acids, vitamins and minerals and nutritionally considerably working as a good source of energy and protein for ruminal microbes, including both soluble carbohydrates and readily digestible NDF fractions. The challenge for the feed formulation is to obtain least cost rations that fully match animal requirements (Maertens *et al*., 2002). Taro (Colocasia esculenta) has high yielding of succulent vegetative wastes and most its varieties contain irritating or acrid agents and therefore cannot be eaten in fresh state. It has been available in large quantities in terms of total area of about 6545 fedden with total production 102563 tons, according to the statistics of Ministry of Agriculture (2016) and the proportion of vegetative growth of about 35% and the proposed ratio of exploited vegetative growth of 17.5% (Desuki and El-Noubi, 1990). Taro by-product can be potentially using as a protein source for animals, especially pigs due to its leaves having (DM basis): 25% CP, 12.1% CF, 10.7% EE, 1.74% Ca, and 0.58% P (FAO, 1993), in addition this by-product is rich in vitamins and minerals like thiamin, riboflavin, iron, phosphorus, zinc, vitamin B6, vitamin C, niacin, potassium, copper and manganese (Wikipedia, the free encyclopedia http://en.wikipedia.org/ wiki/Taro). Taro has great potential as animal feed in the tropical and subtropical area where it is often a staple supply of feed for pigs (Wang, 1983). The anti-nutritional factors found in taro cocoyam include saponins, phytates, tannins and oxalates (Agwunobi *et al*., 2002 and Smith, 1982). These chemical compounds can be reduced by boiling, ensiling, and sun dried (Chhay *et al*., 2007). Many studies have indicated that yeast products can be using as feed supplements may have a significant positive effect on the performance of animals (Bakory, 2014). Yeast has an ability to scavenge oxygen from the rumen making ecosystem more favorable for growth and activity of the rumen anaerobic microbes. It also has the ability to increase cellulolytic bacteria activity in the rumen and increases nutrient digestibility, especially for rich fiber diets. Yeasts have also been shown to regulate the rumen pH and limit acidosis risks through regulating both of lactate producing, lactate utilizing bacteria and it is a rich source of nutrients like peptides, vitamins, organic acids and cofactors which may be required by the rumen bacteria (Montes de Oca *et al*., 2016). The effect of yeast on animal performance and health status varies depending on the livestock conditions, dose, age, and even between studies. However, mode of

action of yeast remains unknown (Belhassen *et al*., 2016). Dried yeast (Saccharomyces cerevisiae) addition inhibit pathogenic bacteria, change microbial metabolism and decrease intestinal pH (Makled, 1991; Miles and Bootwella, 1991), and improved nutritional value of poor quality forages, as well as improved feed intake and milk yield in dairy cows (Jouany and Morgavi, 2007).

The main target of this study was to investigate the effect of dried taro waste (DTW) levels as non-conventional and cheaper feedstuff without or with dried yeast on digestibility, growth performance and some blood parameters of lambs.

MATERIALS AND METHODS

The present study was carried out during the period from October 2015 up to February 2016 at Seds experimental Station, belonging to Animal Production Research Institute (APRI), Agriculture Research Center, Ministry of Agriculture, Dokki, Giza, Egypt. Taro waste that mainly consisted of leaves and petioles (false stems) was collected from Beni-Sueif Governorate directly after harvest their fruits and chopped to 2-3 cm pieces then sun-air dried for being use in this experiment, while dried yeast (DY) was provided by Egyptian Sugar and Integrated Industrial Company, Hawamdia, Giza, Egypt.

Experimental animals and feeding:

A comparative feeding trial was conducted with using twenty four male Ossimi lambs with an average live body weight ~21.5 kg, and 6 months of age using randomized complete block design and lasted 150-d experimental period. Lambs were randomly divided into four similar groups (6 lambs for each). Each group was assigned randomly to feeding one of experimental rations where R1 received 65% concentrate feed mixture (CFM)+17.5% rice straw (RS)+17.5% DTW, R2: 65% CFM+17.5% RS+17.5% DTW with yeast (5g/h/d), R3: 65% CFM+35% DTW, and R4: 65% CFM+35% DTW with yeast (5g/h/d). The amount of CFM were offered twice daily at 8.00 a.m. and 4.00 p.m. in two equal portions and roughage was offered at the beginning of feeding. Animals were housed in four shaded yards and they were weighed biweekly. Daily amounts of experimental rations were calculated according to NRC (1985). Drinking water was available at all times. The experimental animals were healthy and free from external and internal parasites and kept in pens under similar condition. Samples of the ration ingredients were analyzed for crude protein (CP), crude fiber (CF), ether extract (EE) and ash. The chemical analysis of CFM, DTW, RS, DY and the calculated composition of the experimental rations are shown in Table (1).

Digestibility trials:

Digestibility trials were carried out at the end of feeding trial to determine the nutrient digestibility and the feeding values of the experimental rations using twelve Ossimi rams (3for each treatment). Animals were placed in individual metabolic cages for 21 days (14 days as a preliminary period, followed by 7 days as collection period). Animals in each group were fed on one of experimental rations which offered twice daily at 8.00 a.m. and 4.00 p.m., while water was offered freely along the day. Sub samples (10%) of feces was taken once daily then stored at -18 ºC. At the end of the collection period composite fecal samples for each ram were dried at 60 ºC for 72 hrs.

Chemical analysis:

Feed and fecal samples were ground through 1 mm screen on a Wiley mill grinder and representative samples of feed and feces were analyzed for dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE) and ash according to A.O.A.C (2007). At the end of collection period of the digestibility trial, rumen liquor (RL) samples and blood samples were taken from each animal at 4 hrs. after the morning meal. Rumen liquor samples were collected by stomach tube. The ruminal pH values were measured immediately using Orian 680 digital pH meter. Samples were strained through four layers of cheese cloth, and then ammonia nitrogen (NH3-N) was determined according to Conway, and O'Malley (1957). Total volatile fatty acids (TVFA's) concentration was estimated by using steam distillation methods (Warner, 1964). Mineral extracts of dried taro waste (DTW) was prepared and analyzed for Ca after a wet digestion with a mixture of nitric, sulphuric and perchloric acids using an atomic absorption (Unicam 919). Phosphorus was determined colorimetrically, using molybdovanadate reagent according to A.O.A.C. (2007). Total oxalate was determined using the method of Ukpabi and Ejidoh (1989).

Blood samples were withdrawn from jugular vein in heparinized tubes and centrifuged for 20 min. at 3000 r.p.m. Plasma was frozen and stored at -18°C until the time of analysis. Various chemical parameters were colorimetrically determined using commercial kits; following the same steps as described by manufactures. Total protein (TP) was measured as described by the Biuret method according to Henry and Todd (1974); albumin (A) was assayed according to Doumas *et al.* (1971); globulin was calculated by subtracting the albumin value from total protein value; liver functions were assessed by measuring the activities of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) according to Reitman and Frankel (1957); cholesterol was estimated according to Stein (1986); uric acid was detected according to Barham and Trinder (1972); creatinine was measured according to Faulkner and King (1976), while calcium was measured according to Gindler and King (1972).

Statistical analyses:

All data were analyzed using the general linear models procedure of SAS (2004) where data of percentages were subjected to arc-sin transformation to approximate normal distribution before being analyzed and means were separated using Duncan's multiple range tests (Duncan, 1955) for the comparison among group means of the experimental rations when the main effects were significant.

The model used was: $\mathbf{Y_{ij} = \mu + T_i + e_{ij}}$

Where: Y_{ij} = the observation of ij, μ=overall mean of Y_{ij}, T_i = Effect of i (treatments), e_{ij} = the experimental random error.

RESULTS AND DISCUSSION

Chemical composition:

Chemical analysis of CFM, DTW, RS, DY and calculated composition of experimental rations are shown in Table (1). The chemical composition of CFM was closely

comparable to those using commonly in practical field of ruminant feeding. Also, the nutrient content values of rice straw is within the normal range that widely recorded in the literature. The chemical composition of DTW was contained 13.52, 23.64, 2.27, 34.81and 25.76% for CP, CF, EE, NFE and ash, respectively. The present values are within the range that reported by Chhay *et al*. (2009), Du Thanh Hang and Preston (2010), Ngo Huu Toan and Preston (2010) and Du Thanh Hang *et al*. (2014). Concentrations of calcium, phosphorus and total oxalate of DTW were 2.20, 0.31% and 7.9 mg g-1, respectively. Leterme *et al*. (2005) showed that leaves of taro cocoyam (Xanthosoma sagittifolium) contained calcium (up to 69 g kg−1 DM). Dahlgren and Savage (2007) showed that younger taro leaves contained 5.89 g total oxalate per kg fresh weight compared to 4.43 g total oxalate per kg fresh weight for mature leaves grown. Generally, DTW and DY are rich in most nutrients and some bio-compounds and could be used as an ingredient or as an excellent feed supplement in sheep rations. Experimental rations appeared clear differences in its chemical composition as a result of increasing level of DTW in ration from 17.5% to 35% in tested rations.

Table 1. Chemical analysis of ration ingredients and calculated composition of experimental rations (on DM basis, %).

Item	DM	OM	CP	CF	EE	NFE	Ash	Ca	P
CFM	92.34	82.62	15.08	17.31	2.28	47.95	17.38	-	-
Dried taro waste (DTW)	90.67	74.24	13.52	23.64	2.27	34.81	25.76	2.20	0.31
Rice straw (RS)	92.43	83.17	4.38	34.84	0.838	43.11	16.83	-	-
Dried yeast (DY)	91.20	94.10	45.58	0.426	0.436	47.66	5.90	0.13	1.51
Experimental rations:									
R1	92.07	81.27	12.93	21.48	2.03	44.84	18.73		
R2	92.07	81.27	12.93	21.48	2.03	44.84	18.73		
R3	91.75	79.64	14.52	19.56	2.28	43.28	20.36		
R4	91.76	79.72	14.54	19.50	2.28	43.41	20.28		

Ingredients (CFM): 42.0 yellow corn, 13.0 soybean meal, 38.5 wheat bran, 3.0 molasses, 0.5 mineral premix, 2.0 calcium carbonate and 1.0 % salt (as fed).

*** Dried taro waste contained 7.9 mg g^{-1} total oxalate.**

R1: CFM+RS+DTW, R2: CFM+RS+ DTW+ DY, R3: CFM+ DTW and R4: CFM+ DTW+ DY.

Nutrients digestibility and feeding values:

Digestion coefficients and feeding values of experimental rations are given in Table (2). Results of digestibility revealed that the digestibility of most nutrients were significantly improved with increasing level of the DWT in rations and the highest ($P<0.05$) values were observed with animals fed rations contained DTW as a sole roughage either without yeast (R3) or with yeast (R4). The positive effect of DTW without or with yeast on nutrients digestibility could be regarded to its high content of protein or essential amino acids needed to enhance rumen microbial activity. Feeding values as TDN for all rations either without or with yeast addition did not affected by increasing level of DWT, however DCP values were significantly ($P<0.05$) improved as increasing the level of DWT in ration. Results in table (2) revealed that addition of yeast to ration had no significant effect on either nutrient digestibility or feeding values as TDN or DCP however, digestibility of CP and CF were insignificant improved with yeast addition. Recently the findings of Khayyal *et al.* (2017) revealed that nutrient digestibilities did not affected by rabbits fed rations contained different levels (7.5, 15 and 22.5%) of dried taro without or with dried yeast waste (0.5%) being those fed ration contained 22.5% dried taro waste without dried yeast mostly had the lowest values in digestibility of DM, OM, CF, NFE and TDN. In other study respecting DTW, Chhay *et al.* (2007) found that digestibility of DM, OM, CF were higher for pigs fed dried taro leaves than those fed taro silage. Furthermore, Manivanh and Preston (2011) found that apparent digestibility of DM, OM, CP tend to increase with increasing the proportion of taro silage in pigs ration from 25% to 100% (being 85% to 89% for DM and OM, and from 81% to 88% for CP). Regarding yeast addition, Andrighetto *et al*. (1993) reported that DM, CP, NDF and ADF digestibility did not affected by addition of yeast (20-40 g/d) to sheep ration. On the other hand, El-Nahas *et al.* (2009), Mousa *et al*. (2012) and Kassab and Mohamed (2013) reported that nutrient digestibilities were increased by sheep fed rations contained yeast (4g-8g/h/d). Similarly, addition of yeast to the diet of sheep could be improving the digestibility of protein and hemicellulose (Allam *et al.,* 2001). This improvement of nutrient digestibilities could be attributed to the enhancement of microbial efficiency via stimulating rumen proteolytic bacteria and increasing the number of cellulytic bacteria (Williams, 1988 and Dawson *et al.,* 1990). In further explanation, Ojokoh (2007) reported that micro-organism (yeast) can be playing an important role that had either positive or negative effect. The positive effect of microorganism is generally regarded as part of the fermentation; product preservation, decrease anti-nutritional factors and increase the availability of nutrients, vitamins, essential amino acids (proteins) by improving digestibility of protein and fiber.

Table 2. Effect of feeding the experimental rations on digestibility and feeding values.

Item	Experimental rations				±S.E
	R1	R2	R3	R4	
Digestibility, %					
DM	65.81^{b}	66.77^{b}	69.68^{a}	70.35^{a}	±0.570
OM	68.70^{c}	69.21^{bc}	70.60^{ab}	71.98^{a}	±0.502
CP	66.33	68.41	67.52	69.27	±2.596
CF	63.94	65.83	64.14	66.41	±1.809
EE	75.65^{ab}	70.71^{b}	80.62^{a}	79.44^{a}	±2.588
NFE	71.77^{b}	71.31^{b}	74.52^{a}	74.85^{a}	±1.610
Feeding values, %					
TDN	56.91	57.20	57.10	57.85	±0.394
DCP	7.55^{b}	7.78^{b}	9.55^{a}	9.80^{a}	±0.360

[a, b, c] and [d] means in the same row with different superscripts are significantly ($P \leq 0.05$) different.

SE=Standard error

Rumen parameters:

The ruminal pH values, concentration of NH3-N and TVFA´s are shown in Table (3). Data revealed that pH values were insignificantly increased with increasing level of DTW in rations especially with yeast addition (R4). Increasing in pH was generally due to the production of

ammonia (Odetokun, 2000) that largely depending on protein-based fermentation (Adenik *et al.,* 2007). There were no significant differences observed in concentrations of ruminal NH3-N or TVFA´s among the different experimental rations. The slightly increases in concentration of ruminal NH3-N with increasing DTW level may be due to high protein content of DTW. The production of ammonia and amines is quite common during fermentation as a result of protein hydrolysis. On the other hand, addition of yeast to ration led to insignificant decrease of NH3-N and insignificantly increases of TVFA´s for R4 only. Hassan (2014) reported that pH values and TVFA´s concentration were increased and NH3-N significantly decreased by calves fed yeast ration compared with others fed control ration (0 yeas). However, Khorshed (2000) found that a significant increase in ruminal NH3-N concentration with yeast culture addition into crop residue-ration of ruminants. This increase of TVFA´s concentration may be due to the increase of digestibility of organic matter (El-Ashry *et al.,* 2003), higher digestibility of CF or may be resulted from altered microbial population and microbial activity (Doane *et al.,* 1997). Allam *et al.* (1984) reported that the ruminal TVFA´s concentration could be affected by DM digestibility, rate of absorption, rumen pH and microbial population in the rumen and their activity.

Table 3. Effect of feeding the experimental rations on ruminal parameters.

Item	Treatments				±SE
	R1	R2	R3	R4	
pH	5.80	6.10	6.10	6.50	±0.229
NH3-N, mg/100 ml RL	10.03	8.73	10.97	9.52	±1.554
TVFA´s, meq/ 100 ml RL	18.00	18.33	15.65	17.67	±1.698

[a] and [b] means in the same row with different superscripts are significantly (P ≤ 0. 05) different.
SE=Standard error

Blood parameters:

The results of blood parameters for rams fed the experimental rations are presented in Table (4). Data revealed that neither level of DTW nor the addition of yeast had any significant differences among treatments concerning the concentrations of all blood parameters (total protein, globulin, AST, ALT, cholesterol, uric acid, creatinine and Ca) except for albumin. The concentration of total protein was insignificant increased with increasing level of DTW in ration. Addition of yeast to ration led to insignificant increase of plasma total protein while, plasma albumin concentration was significantly increased as a result of yeast addition to ration contained DTW as a sole roughage (R4) only. These increases in plasma total protein and albumin concentrations may be due to high protein content of DTW. Plasma total protein and albumin concentrations have been reported to be in direct response to protein quality and protein intake (Eggum, 1989 and Onifade and Abu, 1998). Onifade *et al.* (1999), Mousa *et al.* (2012) and Kassab and mohamed (2013) reported that blood protein and albumin levels increased and levels of cholesterol, ALT and AST decreased with supplement yeast in rations of rabbits and sheep. Mani *et al.* (1989) reported that non-significant reduction in liver cholesterol, while liver triglycerides were increased for hypercholesterolemia rats fed 10 or 20% dried taro leaves with or without cholesterol. The insignificant decrease of plasma cholesterol could be linked to contents of taro saponins, whose are known to bind with bile acids and cholesterol and therefore such compounds can be purging these fatty compounds from the body and lowering the cholesterol level (Olajide, 2012).

Table 4. Effect of feeding the experimental rations on blood parameters.

Item	Treatments				±SE
	R1	R2	R3	R4	
Total protein, g/dl	6.31	6.44	6.49	6.83	±0.171
Albumin, g/dl	3.90[b]	3.91[b]	3.87[b]	4.38[a]	±0.140
Globulin, g/dl	2.41	2.53	2.62	2.45	±0.104
AST, U/L	62.60	61.5	60.14	67.23	±6.655
ALT, U/L	40.09	39.45	39.57	43.16	±4.790
Cholesterol, g/dl	111.19	109.76	109.52	100.47	±5.213
Uric acid, g/dl	4.89	4.96	5.02	5.11	±0.308
Creatinine, mg/100 ml	1.55	1.50	1.51	1.56	±0.084
Ca , g/dl	8.27	8.28	8.16	7.93	±0.371

[a] and [b] means in the same row with different superscripts are significantly (P ≤ 0. 05) different. SE=Standard error

Also, El-Nahas *et al.* (2009) reported that yeast supplementation led to insignificant changes in concentration of total protein, albumin and globulin in plasma of lambs. Otherwise, Kowalik *et al.* (2012) reported that concentration of serum total protein decreased significantly by addition of live cell yeast to heifer's ration in comparison with those fed control ration. In regard of blood cholesterol, Ismail *et al.* (2004) with rabbits found that supplemented their diets with yeast culture significantly (P ≤ 0.05) reduced the blood plasma cholesterol levels. Also, Kowalik *et al.* (2012) reported that serum total cholesterol concentration was decreased significantly by heifers fed ration contained live cell yeast compared to those fed control one. Generally, the obtained values of blood parameters in this study indicate that all experimental animals were performed with normal physiological and healthy status.

Growth performance and economic efficiency:

The measurements of daily gain, feed intake, feed conversion and economic efficiency are presented in Table (5). Daily DM intake was nearly comparable among groups, being it was slightly decreased with increasing the proportion of DTW in lamb's rations. These results are in agreement with those recorded by Manivanh and Preston (2011) who reported that DM intake and OM intake were decreased for pigs by increasing the proportion of taro silage from 25 to 100% and the highest values of

DMI and OMI were observed with 50% taro silage. Average daily gain (ADG) was insignificant decreased with increasing DTW level in the experimental rations. Lake of effect due to the addition DY was found between either rations R1 & R2 or R3 & R4 ones, however the best daily gain value was associated with R2. This significant increase in ADG might be due to the high TDN intake (kg d^{-1}) for lambs in R2 (0.719). In relation with this point, Mikulec *et al.* (2010) reported that supplementation with yeast (0.5-1 gd^{-1}) did not affect weight gain and body weight with low protein level in the diet of fattening lambs. Also, Piennar *et al.* (2012) found that the inclusion of yeast in diets had no effect on lamb growth performance and this may be due to low fiber content of diet. Concerning feed conversion measurements in the present study, its values did not significant affected by the dietary treatments, being the best value was occurred with R2-ration. These results are in disagreement with those obtained Chhay *et al.* (2014) who reported that feed conversion ratio was improved by increasing the proportion of taro foliage silage up to 60% in

replacement of rice bran with gilts. In respect of economic efficiency, results in Table 5 revealed that feed cost/kg gain was markedly lower (2.95 LE) with the lower level of DTW in ration R2, in comparison with the other dietary treatments. In turn the daily profit (L.E.) was markedly higher with the lower level DTW-ration (R2) which supplemented with DY, compared with the other ones. Economic (daily profit) efficiency were higher with 17.5% DTW-ration (R2) with yeast than that of the other treatments.

Table 5. Effect of experimental rations on growth performance and economic efficiency.

Item	Treatments				±SE
	R1	R2	R3	R4	
Initial weight, kg	21.40	21.40	21.00	21.00	±1.131
Final live body weight, kg	40.60	43.40	38.80	39.00	±1.505
Total body gain, kg,	19.20^{ab}	22.00^{a}	17.80^{b}	18.00^{b}	±1.138
Daily gain, g	128^{ab}	147^{a}	119^{b}	120^{b}	±7.586
Daily feed intake (as fed):					
CFM, kg	0.933	0.915	0.854	0.864	
RS, kg	0.277	0.225	-	-	
DTW, kg	0.277	0.225	0.428	0421	
DY, kg	-	0.005	-	0.005	
Intake, kg:					
DMI	1.277	1.257	1.176	1.180	
TDN	0.727	0.719	0.672	0.682	
Feed conversion:					
DMI, kg/ gain, kg.	9.98	8.50	9.92	9.83	
TDN, kg/ gain, kg.	5.68	4.86	5.66	5.69	
Economic efficiency:					
Price of daily gain, L.E.	6.40	7.39	5.93	6.00	
Daily feed cost, L.E.	4.37	4.36	3.97	4.08	
Feed cost/ kg gain, L.E.	3.42	2.95	3.35	3.40	
Daily profit, L.E.	2.03	3.03	1.96	1.92	

[a] and [b] means in the same row with different superscripts are significantly (P ≤ 0.05) different.

SE=Standard error

The price of concentrate feed mixture =5500 L.E/ton, rice straw= 480 L.E/ton, taro hay=300 L.E/ton, one kg of daily gain = 45 L.E, dried yeast =13 L.E/kg,

CONCLUSION

In conclusion, dried taro waste could be used as a beneficial ingredient in rations of growing lambs with positive effect on nutrient digestibility, some blood parameters, growth performance and economic efficiency, in particularly with the tested ration that contained the lower level of DTW with DY-additive.

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تأثير استخدام مستويات مختلفة من مخلفات القلقاس الجافه بدون او مع الخميره الجافه علي أداء نمو الحملان النامية.

يوسف لطفى فيليب، أدولف عبدالملاك خير ، أماني أمين خيال ، عبد المنعم على سيد محجوب و أسامة عبد السلام

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أجريت هذة الدراسة لمعرفة مدي تأثيراستخدام العلائق المحتوية على مستويات مختلفة من مخلفات القلقاس الجافة بدون او مع اضافة الخميرة الجافة علي معاملات الهضم وأداء النمو وخصائص الدم للحملان الأوسيمي. تم أجراء تجارب الهضم لمخاليط العلائق المختبرة باستخدام كباش اوسيمي (ثلاثة /عليقة) مع قياس نشاط الكرش. وأستخدم اربعة وعشرون ذكر من حملان الأوسيمي بمتوسط وزن 21.5±2كجم حيث قسمت عشوائيا إلي اربعة مجموعات متشابهه (6 ذكر/ مجموعه) فى تجربة النمو والتى استمرت لمدة 150 يوم مع تسجيل الأوزان كل أسبوعين و كانت العلائق المستخدمه كما يلى : 1. عليقه تحتوي علي65٪ من العلف المركز+17.5٪ قش أرز +17.5٪ مخلفات القلقاس الجافة. 2. عليقه تحتوي علي65٪ من العلف المركز+17.5٪ قش أرز+17.5٪ مخلفات القلقاس الجافة+خميرة جافة. 3. عليقه تحتوي علي65٪ من العلف المركز + 35 ٪ مخلفات القلقاس الجافة. 4. عليقه تحتوي علي65٪ من العلف المركز +35٪ مخلفات القلقاس الجافة + خميرة جافة. وقد تم اضافة الخميرة الجافة بمعدل 5جم/رأس/اليوم مع حساب متطلبات التغذية علي أساس NRC (1985). أشارت النتائج إلي إرتفاع معاملات الهضم للعلائق المحتوية علي 35% مخلف القلقاس بدون او مع الخميرة حيث سجلت العليقه الثالثة و الرابعة أعلي قيم هضمية لمعظم العناصر الغذائية تبعها العليقه الثانية ثم العليقه الاولى . فى حين سجلت قيم المواد المهضومة الكلية قيم متقاربة لكل العلائق المختبرة وكانت قيم البروتين المهضوم اعلي للعلائق المحتويه على35% مخلف القلقاس بدون او مع اضافة الخميرة الجافة. وقد أظهرت النتائج زيادة غير معنوية في قيم pH سائل الكرش كما زادت قيم الامونيا بصورة غيرمعنوية مع زيادة مخلف القلقاس في العلائق بينما إنخفض تركيز الأحماض الدهنية الطيارةالكلية انخفاض غير معنوى مع زيادة مخلف القلقاس في العلائق (الثالثة والرابعة) مقارنة بالأولي والثانية وقد ادت اضافة الخميرة الى زيادة غير معنوية فى كل من قيم pH ونسبة الاحماض الدهنية الطيارة الكلية مع انخفاض غير معنوى فى قيم الامونيا . نقص كل من معدل النمو اليومى والنمو الكلى تناقصا غير معنويا بزيادة مستوى القلقاس فى العليقة وان اضافة الخميرة الى المجموعة الثانية ادى تحسن النمو. كما أدي استخدام مخلفات القلقاس الجافة حتى مستوى17.5% الي تحسن ملحوظ للكفاءة التحويلية للغذاء والكفاءة الإقتصادية وخاصة للعلائق المحتوية على17.5% مخلف القلقاس+خميرة. وبصفه عامه لم يلاحظ فروق معنوية بين العلائق لصفات الدم للأغنام المغذاة علي العلائق المحتوية علي مخلفات القلقاس الجافة بين المجاميع. ويمكن القول ان التغذية علي مخلفات القلقاس الجافة حتى مستوى 17.5٪ ليس له اي تاثير ضارعلي وظائف الكبد أو الكلي. وخلصت هذه الدراسة إلي التوصية باستخدام مخلفات القلقاس الجافة حتى مستوى 17.5٪ مع اضافة الخميرة الجافة في علائق الأغنام لما لذلك من تأثيرعلى تحسن أداء نمو الحملان وايضا الكفاءة الأقتصاديه.