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EFEECT OF DIETARY YAE-SAAC SUPPLEMENT ON MILK YIELD AND COMPOSITION OF LACTATING GOATS.

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ABSTRACT

Twelve lactating Damascus goats were used to study the effect of supplememtary live yeast culture (Yea-Saac) on nutrients utilization , rumen fermentation and milk yield and composition . Goats fed ration containing 60% barley grain and 40% berseem hay without or with yeast at 1 Kg / ton ration .

Yeast supplement had no significant effect on the nutrient digestibilities but insignificantly ($P > 0.05$) increased nitrogen balance. The DM and OM digestibility were 67.11 and 68.35 % for yeast unsupplemented group and 66.57 and 69.81 % for the supplemented one. The corresponding values of nitrogen balance were 0.07 and 0.75 g/head/ day. Goats fed yeast supplemented ration showed higher ($P<0.05$) ruminal NH_3-N but the differences in TVFA's concentration and pH values were not significant. Milk yield and composition didn't significantly differ between yeast unsupplemented or supplemented groups.

It could be concluded that yeast supplement had no beneficial effect on nutrients utilization or productive performance of lactating goats when fed high quality ration (60% barley+40% hay), however, increased feeding coast by 60 L.E. per ton ration .

Keywords: lactating goats, live yeast, digestibility, rumen fermentation, milk yield and composition .

INTRODUCTION

The use of biological feed additives particulary live yeast culture, is finding favour as means of improving the performance of ruminants (Wallace and Newbold,1993) .Yeast culture is commercially produced by Alltech Inc. Nicholasville,Kentucky,U.S.A., and marketed under the trade name "Yea-Saac" based on a special strain of yeast (code No. 1026) which is composed of strain *Saccharomyces cervisiae* grown in bactch culture on a media of corn, molasses ,molt and trace minerals. Dawson *et al.*, 1990, indicated that yeast strains which can be used as animal feed supplements must be initially recoginized as safe and should not pose a health risk to the animal or humman consumer .

Yeast culture have been shown to modily rumen fermentation (Adams *et al.*,1981) ,which influences nutrients digestibility (Arambel *et al.*, 1990), dry matter intake (Wohlt *et al.*, 1991) and milk production (Allam *et al.*, 2001) There were many factors governing the effect of yeast culture on animals performance, including animal species, kind of feed and roughage : concentrate ratio.

The objectives of this study were to determine the effect of dietary yeast culture addition on nutrient digestibility, ruminal fermentation, nitrogen balance and milk production of goats.

MATERIALS AND METHODS

The present study was carried out at the Experimental Station, Department of Animal Production, Faculty of Agricalture, Cairo Universty .

Experimental animals and their diets

Twelve Damascus goats of about 36.65 Kg live weight at their midlactation period (60 days in milk) were divided into two groups of six. All animals were in the third lactation season. The control group (unsupplemented group) was fed a daily basal production ration consisting of 60% crushed barely grain with 40% berseem hay. Based on the former 10 days milk yield, the daily requirements of total digestible nutrients and digestible crude protein for each animal were given according to NRC, (1989) recommendations. Each animal in the treatment group (supplemented group) was fed The same ration pluse live yeast culture.The yeast culture (YC) used in this study was American commercial product (code No.1026), in powder form (92%DM) and composed of live *Saccharomyces ceravisiae* ($5X10^9$ organisms/g)plus growth media . The supplement was added directly at rate of 1Kg/ton into the ration at the time of feeding.All animals were housed and fed individually. The daily rations were divided into two equal parts represented at 08:00 and 20:00 h. Water was offered twice daily at 09:00 and 21:00 h. The experimental period lasted for 30 days, the first 21 days were used for adaptation . The digestion trial, milk recording and sampling were carried out from days 22 to 28. Rumen fluid samples were taken for the last two conscecutive days.

Milk sampling procedure:

Goats were milked twice daily at 06:00 and 18:00 h. Milk yield was measured and recorded daily (7days) for all goats.Samples were taken at consecutive morning and afternoon milking on a daily basis for each goat, a composite sample was produced for analysis according to AOAC,(1990) .

Digestibility and N balance trials:

Total fecal and urine collections were performed for 7 days. Urine was collected in 5L polyethylene containers that contained 50 ml of 50% H_2SO_4. Urine volume was recored daily and a portion (10%) was stored at 4°C for composite by volume at the end of the collection period. Fecal amount was measured daily stored at 4°C and composited. Collected composites of feces and feeds were oven – dried and ground for analysis, as described by AOAC,(1990).

Rumen fluid sampling procedure.

At the end of the experimental period rumen fluid (RF) samples were taken on 2 consecutive days (from day 29 to 30) at 0, 2, 4 h. after the morning feeding via the stomach tube. About 100 ml sample of rumen fluid was withdrawn and collected directly in plastic bottle. The RF was strained through two layers of cloth then its pH recorded immediately. Strained RF was analysed within 10 minutes for total volatile fatty acids (TVFA's) concentration (Erwin *et al.*,1961) and NH_3–N concentration (Conway, 1963).

Statistical analysis:

Statistical analysis of data was carried out according to Snedcor and Cochran,(1982) and the differences among means were tested by using Duncan' s multiple range test (Duncan,1955) .

RESULTS AND DISCUSSION

The Chemical composition of the two feed ingredients used two formulat the expermental rations (Table 1) are within the normal range in Egypt (Abou-Raya, 1967). This was reflect on the composition of the basal ration according to their proportion in the ration (60 barley: 40 hay).

Table 1: Chemical composition of feeds and basal ration.

Item	Feeds		Basal ration*
	Barley	Hay	(60%barley+ 40% hay)
DM,%	89.90	88.95	89.18
DM composition, %			
OM	91.10	85.00	89.10
CP	9.41	17.13	12.32
CF	9.92	32.24	18.40
EE	2.05	2.17	2.10
NFE	69.72	33.46	56.28
Ash	8.90	15.00	11.90

*Supplemented with 2% limstone, 0.5% common salt and 0.33% Vit.&Min. premix .

Addition of YC to the ration did not significantly affect the apparent digestibilities of DM, OM, CP, CF, EE and NFE (Table 2).

Table 2: Apparent digestibilities and nutritive values of the experimental rations.

Item	Experimental rations		
	Without YC	With YC	±SE
Digestibility,%			
DM	67.11	66.57	0.90
OM	68.35	69.81	1.82
CP	62.49	62.57	1.31
CF	48.86	48.96	2.01
EE	77.62	77.59	1.73
NFE	79.64	78.56	0.63
Nutritive value,%			
TDN	65.19	64.61	1.38
DCP	7.69	7.84	1.15

The effect of YC supplementation on digestibilities is in agreement with that reported by Harrison *et al.*,1988, Huhtanen 1991 and Mutsvangwa *et al.*,1992. However, other workers had reported that there was a positive effect on nutrients digestibility with YC supplementation (Weidmeir *et al.*, 1987, Harris *et al.*, 1992 and Allam *et al.*, 2001). The variation in the type of

ration of these studies could partly explain the differences observed in the results. The insignificant difference in CF digestion when supplemented YC ration was fed is in contrast to the expectations of the increase in number of cellulytic bacteria in the rumen as reported by many investigators (Koul *et al* 1998, Kumar *et al.* 1997 and Dawson, 1990). In this connection , the digestibility of the ration is more related to the physicochmical structure of the forage and ruminal retention time, since the presence of YC is unlikely to influence cellulor structure of plant tissue (Hovell *et al.*, 1986). Moreover, Harrison *et al.*, 1988, noticed that increases in the cellulytic bacteria number did not correspond to the increase in digestion of cell wall , cellulose or hemicellulose.

The effects of the live yeast culture supplementation to the ration on pH values and concentrations of NH_3-N and TVFA's in the rumen are shown in Table (3).

Table 3: Effect of YC supplementation on rumen fluid characteristics .

Sampling time	pH	TVFA s	NH_3 -N
Without YC			
0	6.812^{a}	5.715^{bc}	8.557^{ab}
2	6.393^{b}	6.182^{ab}	10.670^{a}
4	6.362^{b}	6.238^{a}	8.675^{ab}
With YC			
0	6.702^{a}	5.198^{bc}	7.331^{b}
2	6.395^{b}	6.177^{ab}	7.402^{ab}
4	6.455^{b}	5.795^{ab}	9.085^{ab}
SEM	0.11	0.33	1.02
Significancy			
Sampling time	0.004	0.001	0.05
Yeast supplement	NS	NS	0.05

^{a,b,c} Means with different superscripts in the same row are significantly different at ($P<0.05$).

Results indicated that, pH was significently decreased after feeding in both two groups. In contrary , TVFAs and NH_3-N were insignificantly increased after feeding time. It could be stated that , their were insignificant defferance in rumminal pH and TVFs bettwen the two groups. The NH_3-N concentrations were significantly ($P<0.05$) decreased by YC supplementation (Arambel and Kent., 1990; Martinand and Nisbet, 1992 and Mir and Mir, 1994) indicated that YC supplementation increased ruminal NH_3-N concentration. While, Harrison *et al.* (1988) reported lower ruminal NH_3-N concentration when YC was add to the rations of Holstien cows. They concluded that the increase in the numbers of total anoarobic and cellulytic bacteria could be responsible for more utilization of the NH_3-N for ruminal microbial protein synthesis and growth. No significant difference in TVFA's concentration was detected in the rumen of animals receivied YC ration comparing with those fed the control ration. Published results on the effect of YC on TVFA's concentrations are varied. This study as well as other studies by Adams *et al.*,1981; Weidneier *et al.*,1987; Harrison *et al.*,1988;

Chademana and Offer 1990, indicated that YC had no effect on TVFA's but others found that YC supplements altered the patterns of TVFA's production in the rumen (Chiquette, 1995 and Martin *et al.*, 1989).

Ruminal pH was unaffected by YC supplementation (Table 3) . This result agreed with that reported by Newbold *et al.*,(1990) who detected small elevations in ruminal pH when YC was added to ration consists of barley grain plus dried grass (1:1). Data in this study indicate that there was a slight changes in the rate of rumen fermentations as a result of YC supplement.

Nitrogen intake (Table 4) was nearly the same in the both two groups (19.87 *vs* 20.03 g/head). Fecal and urinary nitrogen were insignificantly affected by YC supplementation.Therefore,YC supplemente did not signifficantly effect on nitrogen balance. Similar results have been reported by Adams *et al.*, (1981) for lambs and Mutsvangwa *et al.*, (1992) for bulls.

There was insignificant effect of YC supplementation on the daily intake of DM, TDN and DCP (Table 4) . Stablization of feed intake in the present study is in agreement with the results of Williams *et al.*, (1991), Erasmus *et al.* (1992) and confirminy with other studies (Gomez-Alacron *et al.*, 1991 and Chiquette, 1995).

Table 4: Daily feed intake of nutrients and nitrogen balance.

Item	Experimental rations		
	Without YC	With YC	±SE
Feed intake, g/head/day	1008	1016	63
DM	657	656	14.33
TDN	77.60	78.32	2.30
DCP			
Nitrogen balance:	19.87	20.03	1.33
N. intake, g/head/day	7.38	7.60	0.42
Fecal N , g/head/day	9.70	9.22	1.12
Urinary N, g/head/day	2.72	2.46	0.50
Milk N, g/head/day	+0.07	+0.75	1.06
N balance, g/head/day			

The effects of YC addition to the ration of lactating goats on milk yield and composition are shown in Table (5). Milk yield as 4% fat-corrected milk and milk components tended to decrease by YC supplementation . No significant differences were reported in milk yield or in fat and lactose yields. Chiquette., (1995) and Robinson., (1997) reported that milk yield and milk components (g/day) were not affected by YC supplementation to the ration of dairy cows. However, Williams *et al.* (1991) suggested that YC addition to the dairy cow's ration increased milk yield as a result of increasing feed intake. In this study, the little difference in DMI (Table 4) might be responsible for the slight positive affects of milk yield and milk components.

Table 5: Milk yield and composition for lactating goats fed the experimental rations.

Item	Experimental rations		
	Without YC	With YC	±SE
Milk yield, g/ head/ day	406	409	21
Actual	452	444	
4% FCM			
Milk composition :	4.75	4.57	0.07
Fat , %	19.29	18.69	
Gram / day	4.28	3.84	0.16
Protein , %	17.38	15.71	
Gram / day	3.57	3.41	0.68
Lactose, %	14.49	13.54	
Gram / day	0.88	0.88	0.01
Ash , %	3.57	3.60	
Gram / day	13.48	12.61	0.83
Total solids , %	54.63	51.54	
Gram / day			

Under the experimintal conditions of the present study, many of the changes associated with the addition of YC to the ration were marginal and often not statistically significant. It could be concluded that, yeast supplement had no beneficial effect on nutrients utilization or productive performance of lacting goats when fed high quality ration (60% barley+40% hay), however, increased feeding coast by 60 L.E. per ton ration. Although there is undoubtedly a need for natural feed additives to enhance feedstuffs utilization, these additives should have clearer and more constant affects in order to have an increased value as supplements in ruminants feeding. Further studies are required to go deeply in studying the effect of YC supplementation on the performance of ruminants, and a greater understanding is needed of the interactions between YC supplementaion and ration composition.

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تأثير إضافة الخميرة الجافة على إنتاج اللبن ومكوناته فى الماعز الحلاب .

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أجريت تجربة على اثنى عشر من الماعز الدمشقى الحلاب ، لدراسة تأثير إضافة الخميرة الجافة على الاستفادة من الغذاء ونشاط الكرش وانتاج اللبن ومكوناته ، حيث غذيت الماعز على عليقة تتكون من (٦٠% مجروش حبوب الشعير+ ٤٠% دريس البرسيم) بدون (مجموعة المقارنه) او باضافة الخميرة الجافة بمعدل ١ كجم لكل طن عليقة (مجموعة المعاملة) .

لم يكن لإضافة الخميرة الجافة تأثير معنوى على معاملات الهضم ،فكانت للمادة الجافة والمادة العضوية ١١و٦٧ ، ٣٥و٦٨% لمجموعة المقارنه بينما كانت ٥٧و٦٦، ٨١و٦٩ %لمجموعة المعامله ، وقد زاد ميزان النيتروجين زيادة غير معنوية فكان ٠٧و٠ ، ٧٥و٠ جم/ رأس/ يوم للمجموعتين الاولى والثانية على الترتيب . وقد ادى اضافة الخميرة الجافة الى ارتفاع معنوى فى تركيز امونيا الكرش ، وان كانت الاختلافات غير معنوية بالنسبة لتركيز الاحماض الدهنية الطيارة الكلية وحموضة سائل الكرش ، ولم يكن هناك اختلافات معنوية بين المجموعتين بالنسبة لانتاج اللبن ومكوناته .

، يمكن ان نستخلص من ذلك ان اضافة الخميرة الجافة لم تحسن الاستفادة من المركبات الغذائية اوالاداء الانتاجى للماعز الحلاب ، عندما غذيت على عليقة عالية الجودة (٦٠% شعير + ٤٠% دريس) بل ادت الى زيادة تكاليف التغذية بمعدل ٦٠ جنيه لكل طن عليقة .