UTILIZATION OF GROWTH PROMOTERS AND BENTONITE IN SHEEP RATIONS

By

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B.Sc. (Animal Production) Faculty of Agriculture, Al-Azhar University, 1995
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LIST OF ABBREVIATIONS

A.O.A.C Association of Agriculture Chemists
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<th>Description</th>
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<td>A/G</td>
<td>Albumin to Globulin ratio</td>
</tr>
<tr>
<td>ADF</td>
<td>Acid detergent fiber</td>
</tr>
<tr>
<td>ALT</td>
<td>Alanine aminotransferase</td>
</tr>
<tr>
<td>AST</td>
<td>Aspartate aminotransferase</td>
</tr>
<tr>
<td>Avg. daily gain</td>
<td>Average daily gain</td>
</tr>
<tr>
<td>Bent</td>
<td>Bentonite</td>
</tr>
<tr>
<td>BW</td>
<td>Body weight</td>
</tr>
<tr>
<td>C</td>
<td>control</td>
</tr>
<tr>
<td>Cd</td>
<td>Cadmium</td>
</tr>
<tr>
<td>CF</td>
<td>Crude fiber</td>
</tr>
<tr>
<td>CM</td>
<td>Concentrate mixture</td>
</tr>
<tr>
<td>CP</td>
<td>Crude protein</td>
</tr>
<tr>
<td>CSC</td>
<td>cotton seedcake</td>
</tr>
<tr>
<td>Cu</td>
<td>Copper</td>
</tr>
<tr>
<td>DCP</td>
<td>Digestible crude protein</td>
</tr>
<tr>
<td>DMI</td>
<td>Dry matter intake</td>
</tr>
<tr>
<td>DVYC</td>
<td>Diamond v&quot;xp&quot; yeast culture</td>
</tr>
<tr>
<td>DY</td>
<td>Dry yeast</td>
</tr>
<tr>
<td>EE</td>
<td>Ether extract</td>
</tr>
<tr>
<td>FE</td>
<td>Fermentor effluent</td>
</tr>
<tr>
<td>FF</td>
<td>fauna-free</td>
</tr>
<tr>
<td>FL</td>
<td>Flavomycin</td>
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<tr>
<td>FM</td>
<td>Fish meal</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>GOT</td>
<td>Glutamine oxaloacetic transaminase</td>
</tr>
<tr>
<td>GPT</td>
<td>Glutamine pyruvate transaminase</td>
</tr>
<tr>
<td>g</td>
<td>Gram</td>
</tr>
<tr>
<td>g/kg/day</td>
<td>Gram per kilogram per day</td>
</tr>
<tr>
<td>hrs</td>
<td>hours</td>
</tr>
<tr>
<td>IgG</td>
<td>(immunoglobulin)</td>
</tr>
<tr>
<td>K</td>
<td>kaolin</td>
</tr>
<tr>
<td>kg</td>
<td>kilogram</td>
</tr>
<tr>
<td>LDY</td>
<td>Live dried baker's yeast</td>
</tr>
<tr>
<td>L.£</td>
<td>Egyptian pound</td>
</tr>
<tr>
<td>Na B</td>
<td>Sodium bentonite</td>
</tr>
<tr>
<td>NFE</td>
<td>Nitrogen free extract</td>
</tr>
<tr>
<td>NDF</td>
<td>Neutral detergent fiber</td>
</tr>
<tr>
<td>NH3</td>
<td>Ammonia</td>
</tr>
<tr>
<td>NH3-N</td>
<td>Ammonia nitrogen</td>
</tr>
<tr>
<td>No</td>
<td>Number</td>
</tr>
<tr>
<td>NV</td>
<td>Nutritive value</td>
</tr>
<tr>
<td>OM</td>
<td>Organic matter</td>
</tr>
<tr>
<td>RS</td>
<td>Rice straw</td>
</tr>
<tr>
<td>PKC</td>
<td>Palm kernel cake</td>
</tr>
<tr>
<td>SBM</td>
<td>Soybean meal</td>
</tr>
<tr>
<td>SE</td>
<td>Starch equivalent</td>
</tr>
<tr>
<td>U</td>
<td>Urea</td>
</tr>
<tr>
<td>UT</td>
<td>Urea + tafla</td>
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INTRODUCTION
Meat production in Egypt did not yet reach acceptable of self sufficiency level because of the limited number of livestock population and the low productivity of local breeds, besides wrong policies where young animals are slaughtered regardless of slaughter legislations. Efforts are made in spite of the limited resources to increase production through the utilization of materials that reduce the passage rate of the digesta into the intestinal canal in order to improve efficiency of digestion and consequently improving feed utilization.

Bentonite, like other clay materials is a crystalline aluminosilscates characterized by its ability to exchange cations without major changes in structure; it is used in ruminant animal diets to improve digestibility of nutrients (Pulatov et al., 1983, Kirilov and Burikhonov, 1993 and Saleh et al., 1999), daily gain and feed intake (Lindermann et al., 1993). Bentonite can be used as a feed binder that produces a marked increase in firmness of feed pellets (Martin et al., 1969). It can absorb toxic products of digestion and decreases the accumulation of toxic substances in tissues, thus decreasing the incidence of internal disorders (Uneo, 1977 and Mckenzie, 1991).

Attempts have been made to use chemical products, especially antibiotics and hormones to increase meat production. Supplementing animal diets with yeast culture
have been reported to improve average daily gain (Mutsvangwa et al., 1992).

Live yeast culture is very active in forming amino acids and vitamins. It promotes fermentation by secreting various digesting enzymes within the ruminant stomach and stabilizes the flora in the stomach and intestines by supplying the nutrients which are necessary for their growth. The addition of yeast culture increased dry matter intake, daily gain and feed efficiency by beef cattle (Mir and Mir, 1994b).

Flavomycin is a phosphoglycolipid antibiotic that has been used exclusively as an antimicrobial growth promoter, since its discovery in the mid-1950's (Wallhausser et al., 1965, Bauer and Dost, 1974). Flavomycin is known to promote growth in ruminants and a variety of other species (Rebolini et al., 1982), inhibits bacterial growth by competitive inhibition of the enzyme that catalyses the transglycosylation reaction during peptidoglycan biosynthesis (Van Heijenoort, et al., 1978, Huber, 1979; Van Heijenoort, 2001). The main mode of action of flavomycin seems to involve two groups of bacteria, namely HAP species and Gram–negative fusobacteria. (Attwood et al., 1998).

The present experiment was conducted as an attempt to test the effect of addition of bentonite, dry yeast
(S. cerevisiae) and flavomycin to the diet of sheep on dry matter intake, nutrients digestibility, nutritive value, some ruminal activity parameters, blood constituents, performance of growing lambs and carcass quality of the experimental animals.

2-REVIEW OF LITERATURE

2-1-Definition of growth promoters:
2-1-1-Growth promoters:

During the last decade, many feed additives were available as antibiotics, enzymes and probiotics. These compounds were added to the grower buffalos and rabbit, milking and fattening diet for farm animals in Egypt, to improve the growth performance, nutritional parameters and carcass traits (El-Ashry et al., 1993; El-Basiony, 1994; El-Hassan et al., 1996; El-Sayaad 1997; Abd –Elhakeem et al., 1998; Abou Ammou and El-Hosseiny, 1999 and Allam et al., 2001). Feed additives are widely used in order to increase body weight gain of farm animals, particularly those species known with their slow growth rate. Nevertheless, conflict results were obtained. Probiotics have been used as a supplement in animal feeds for more than seven decades for improving animal performance that obtained by including small amounts in animal feeds, (Dawson, 1995) Moreover, many of the beneficial productive responses associated with the use of probiotic supplements can be directly related to their effects on the microbial population in the digestive tract (Nahashon et al., 1992) The mode of action of probiotics may be due to producing antibiotic substances and inhibiting harmful bacteria metabolism and decreased intestinal pH (De-Blas, et al., 1991)
2.1.2. *Flavomycin*:

*Flavomycin* is a trade name of the antibiotic growth promoter "Flavophosholipol". It is a gluco–lipid containing phosphorous. According to *Bauer and Dost (1974)*, *Flavomycin* is unrelated to any of traditional antibiotics and is the first representative of a new group of drugs which has an effect on numerous grams –positive and many grams, negative bacteria that found in the digestive tract. *Flavomycin* is used as feed additive to promote the growth in ruminant (*El-Basiony, 1994*), no residues are left in the meat since they are not absorbed from the alimentary tract due to their high molecular size (*Hudd, 1983*).

2.1.3. *Pronifer*:

*Pronifer* is a fermentation product and is a bacterial cocktail of specific lactic acid producing bacteria. As a probiotic agent; it may act through improving the balance of the intestinal micro flora. According to *Bohn and Srour (1995)*, *Pronifer* improves health performance, minimize diarrhea and increase growth rates. On the other hand, on previous work on buffalo heifers (*El–Ashry et al., 1993 and El-Basiony et al., 1998*). Using lactobacillus concentrates and yeasts as a supplement in ration for growing buffalos confirmed these results. In the same time, there is no response to *Pronifer* supplementation in buffalo ration in
the rate of 1 kg/ton CFM in other study (El-Basiny, 2001).

2.1.4. Panacur:

Panacur is a new product and the active ingredient is fenbendazole, a member of benzimidazole group of compounds. These compounds are known to possess good anthelmintic activity. Although Panacur was used as anti-parasites at first, it used now as a growth promoter.

2.1.5. Dry yeast:

Yeast culture have been used as non-hormonal compound that stimulate meat or milk production by manipulating rumen microbial activity (Khalifa et al., (2001)).

Yeast are known as rich sources of vitamins, enzymes and other important nutrients and co-factors which make them attractive as digestive enhancers and as basic source nutrients. Yeast culture has been shown to have several effects in ruminants, since it alters feed performance and nutrient digestibility (Wohlt et al., 1991; El-Waziry et al., 2000 and El-Talty et al., 2001), and protein synthesis in the digestive tract (Williams, 1988). Yeast supplementation led to a significant increase of the total viable bacteria in rumen (Wallace and Newbold, 1993); also, microbial flow from the rumen was increased. Improve milk production and composition in dairy animals was found with dietary

Nowadays, the use of defined yeasts as feed supplements for ruminants and monogastric animals has become a common practice (Dawson, 1993). Supplementing animal diets with live baker's yeast (Saccharomyces cerevisiae) improved appetite, rumen function, milk production and animals' performance (Besong et al., 1996). Variation in efficacy of yeasts on milk traits may be related to several factors affecting the response of dairy cows to yeasts supplementation. Stage of lactation, type of forage and forage concentrate ratio (Erasmus et al., 1992) and /or an interaction between the diet and yeast supplementation (Lyons, 1993). It has been reported that yeast culture such (YC) as Lacto-Sacc increases the efficiency of energy utilization and improves metabolites (Abdel –Khalek et al., 2000 and El-Ashry et al., 2001b), and increasing flow of bacterial nitrogen to the small intestine (Erasmus et al., 1992), which stimulate protein synthesis in growing animals. Supplementation of YC in ruminant diets to improve performance has been reviewed (Williams, 1989 and Wallace, 1996. Moloney and Drennan 1994) concluded
that dietary inclusion of yeast culture had a small influence on rumen fermentation parameters and *in vivo* digestibility.

However, Olson *et al.*, (1992) indicated that yeast culture supplementation can increase true rumen organic matter digestibility and resulted in greater microbial efficiency. Walli (1994) stated that growth and milk production responses were favourable when yeast culture was included in ruminant diet. The author found that yeast utilizes rapidly fermentable carbohydrates, reducing the production of lactate and thereby increasing rumen PH on high concentrate diets. Many studies indicated that yeast culture improved milk production and affected its composition (Higginbotham *et al.*, 1994; Sengupta *et al.*, 1994; Kumar *et al.*, 1994; Kobeisy and Ibrahim, 1991; Singh and Singh, 1993 and Piva *et al.*, 1991).

2.1.6. Bentonite:

Bentonite like other clays is crystalline aluminosilicates characterized by its ability to exchange cations without major changes in structure (Kalivoda, 1987) it is an inorganic material with great ability for increasing absorption and for base exchange (Saleh, 1994) Is one of the common natural clays used in animal diets to improve digestibility of nutrients (Pulatovet *et al.*, 1983, Kirilov and Burikhonov, 1993 and Saleh *et al.*, 1999) and daily gain and feed intake
Bentonite can absorb toxic products of digestion and decreases the accumulation of toxic substances in tissues, thus decreasing the incidence of internal disorders (Uneo, 1977, Huntingto et al., 1977, Dunn et al., 1979, and Mckenzie). Bentonite has the ability to adsorb ammonia from a solution when the concentration of ammonia is high, and to release it when the concentration falls (Martin et al., 1969 and Saleh, 1994). Therefore, the addition of bentonite to the diet can partly equalise the supply of nitrogen to the rumen micro-organisms, so, bentonite could be considered as a useful component in the ration containing high soluble nitrogen (Ousterhout, 1970 and Bartos et al., 1982).

2.2: Nutrients digestibility coefficients and nutritive value:

Al-Jassim et al., (1983) added viable yeast (S.cerevisiae) as a protein supplement to a roughage diet. They found an increase in the amount of crude protein digested in the intestines of sheep.

Korniewicz et al., (1985) divided 60 Long wool male lambs (80 days old and 24 kg live body weight) into 4 groups of 15 each. Lambs were fed to 35 kg live body weight on a complete feed of ground barley, maize meal, grass meal and protein concentrate. Groups were not given or given
salinomycin 25 mg, flavomycin 10 mg or salinomycin 25 mg for 4 weeks and then flavomycin 10 mg/kg feed. They observed that digestible crude protein was 728, 639, 678 and 631 g, respectively. Nutrient digestibility was similar in all groups, while Nitrogen retention was 30.2%, 35.5%, 35% and 32.4%, respectively of intake.

Ha et al., (1985b) used lambs weighing 35kg on the average and housed in metabolism cages to study the effect of bentonite, limestone, and NaHCO3 at 2% levels and lucerne hay at 10% added to all-concentrate lamb diets. They found that lambs fed on 2% NaHCO3 digested more (P<0.05) DM, crude protein, nitrogen-free extract and starch, while 2% limestone increased (P<0.05) fiber digestibility. Dietary buffers generally, reduced percent of faecal starch and improved starch digestibility. A distinctive improvement (P<0.05) in starch digestibility was obtained by feeding NaHCO3. Higher (P<0.05) Mg retention was obtained by feeding 2% Bentonite or NaHCO3. More (P<0.01) Ca was retained by limestone-fed lambs.

Aitchison et al., (1986) used 12 ewes weighing 42 kg on the average fitted with rumen cannulae in metabolism crates and given 800 g oaten chaff for 14 days and progressively adapted during 7 days to a high-grain pelleted diet; on day 8 all sheep were given 1500 g pellets only. Pellets consisted of
wheat 250g, barley 250g, oats 250g, roughage 240g or 200g, minerals and vitamins 10, and commercial bentonite 0 or 40 kg/ton. Addition of bentonite resulted in a significant reduction in organic matter digestibility and in dietary N retention. They reported that inclusion of bentonite in pelleted diets depressed diet digestibility and nitrogen retention when sheep were changed gradually from a chaff diet to a high–grain pelleted diet.

Schrijver et al., (1990) used 40 Belgian Blue bulls, about 352 kg. They were freely given maize silage (period 1) then beet pulp (period 2) with flavomycin 0 or 10 mg/kg. Supplementing concentrates with flavomycin 10 mg/kg did not influence apparent digestibility of nutrients of sugar beet pulp.

Malcolm and kiesling (1990) found that apparent digestibility of dry matter was not influenced by treatment when Hereford steers were fed concentrate 1) a basal grain mix. Composed of corn, ground barley and rice bran, 2) basal mix .with 10% whole cottonseed (WCS), 3) basal mix. With 1.6%live yeast culture (YC) and 4) basal mix. With 10 % (WCS and 1.6%YC).

Ivan et al.,(1992a) fed Canadian Arcott wethers, 46 to 49 kg faunated and fauna free,on maize silage base diets
without or with bentonite for 21 days. The disappearance of N from the digestive tract was decreased (P<0.05) by bentonite, whereas the disappearance of organic matter and acid detergent fiber was not affected. They concluded that the Beneficial effects of defaunation or bentonite supplementation in faunated sheep were due to the improved supply of feed and bacterial protein to the intestinal tract.

Popp et al.,(1993) observed that the supplement of flavomycin increased the total digestibility of organic matter. The digestibility of starch and sugar was between 97% and 98% in Friesian bulls fitted with re-entrant cannulas at the duodenum. The balance of the nutrients in the digestive tract showed that, by flavomycin suppletion the degradation of organic matter and crude protein in the forestomach was decreased and the amount of organic matter and crude protein in the gut was increased.

Waghorn et al.,(1994) studied the effects of the addition of salt (to provide 0.51% sodium) and 3.0% bentonite without or with Na (0.49% Na) to hay-based pelleted diets under conditions resembling those used for the shipment of live sheep. They found that addition of bentonite increased faecal DM percentage (P<0.05). Effect of additives on faecal water evaporative loss and hardness were not significant. A large variation (52.1-62.6%) was observed between sheep in DM
digestibility of feeds which was not affected by treatment.

Robinson (1997) used 20 multiparous Holstein cows for approximately 14 d prepartum and exactly 14 d postpartum and fed different basal diets that were supplemented, or not supplemented with yeast culture. Results of both the pre- and postpartum periods were consistent with the hypothesis that supplementation of yeast culture in the diet increased net digestion in the forestomach, particularly fiber, leading to increased energy output.

Wohlt et al., (1997) divided cows into three groups and fed them a mixture of corn silage and concentrate 1:1 plus 0, 10 or 20 g/d of yeast. They found that yeast supplementation significantly improved the digestibility of crude protein and acid detergent fiber. Least square mean of crude protein digestibility was 78.5, 80.8 and 79.5%, and acid detergent fiber digestibility was 54.4, 60.2, and 56.8%, respectively.

El-Badawi et al., (1998) used 12 primiparous Egyptian Baladi does (18-20 months old and 21.4 kg average live weight) and ranked them into 3 groups one week after kidding to receive one of 3 rations containing dry yeast culture (YC) at 0, 1 and 2 g/kg concentrate mixture (CM). Unsupplemented or YC-supplemented CM was fed at 2% (on a DM basis %) of body weight with ad libitum berseem hay (Trifolium alexandrinum). They found that the higher
supplementation level (0.2% YC) was accompanied by a decrease (P<0.01) in digestion coefficients for CP, ether extract, crude fiber and N-free extract.

Doreau and Jouany (1998) observed that dry matter content increased when *Saccharomyces cerevisiae* was supplemented to the diet with daily dose of 50g premix containing 0.5 of S. cerevisiae (6x10^8 cfu/g of premix). *In situ* ruminal degradability of DM and NDF from corn stalk and of N from soybean meal were not modified. However, degradability of ADF from corn stalk increased (32.5% vs 26.3%) with the addition of *S. cerevisiae*. When used four cows in early lactation. The original diet consisted of 60% corn stalks silage and 40% concentrate.

Saleh et al., (1999) used eighteen lactating buffalo cows (weighting 558.33 kg and aged six years), two months after calving to study the effect of dietary bentonite supplementation on performance during 12 weeks postpartum. Buffaloes were fed one of the following rations: I concentrate + rice straw (control); II, ration I + 3% bentonite (of concentrate); III, ration I + 6% bentonite (of concentrate). Results indicated that digestion coefficients of DM, OM, CP, NFE and nutritive values were improved by adding bentonite to concentrate.

Cabrera et al., (2000) used growing steers in a feeding
trial consisted of a grazing control group (CG), a group receiving 10g/day SC(SC); and the supplements 100% urea or 50:50% urea and meat meal. They found that total tract digestibility of NDF and ADF were not affected by treatments. They concluded that *saccharomyces cerevisiae* did not improve either animal performance or fiber digestibility.

Allam *et al.*, (2001) found that yeast supplementation improved nutrients digestibility, nitrogen balance and nutritive value of ration, especially at the level of 2.5g/head/day when sheep were fed one experimental ration with three different levels of yeast (zero, 2.5 and 5g/head/day).

Ivan *et al.*, (2001) fed sheep three isonitrogenous palm kernel cake (PKC)-based diets, control (C); C plus bentonite (CB) and CB plus casein (CBC) as experimental treatments. The C and CB diets contained 94.5% PKC, and comprised four sheep each, while the CBC diet contained 82% PKC and 2.2% casein. Cellulose was used to bring diets C and CBC to 100% of dry matter. They found that the total tract digestibility (%) ranged between 61.9 and 71.3 for organic matter, 65.0 and 72.2 for neutral detergent fiber, and 73.5 and 76.6 for nitrogen.

Salem *et al.*, (2001) showed that bentonite supplementation improved (p<0.05) OM, CP, CF an EE digestibility...
and nutritive value (TDN and DCP) in tested rations (T2 and T3). Tested rations were; control (T 1) consisted of a concentrate feed mixture plus berseem hay and rice straw, (T2) consisted of T1+4% bentonite of concentrate, (T3) consisted of T1+8% bentonite of concentrate).

El –Ashry et al., (2001b) studied the effect of live dried bakery yeast and of yeast culture on performance of growing buffalo calves. Twelve growing buffalo calves (6.31± 0.25 month old and 112.5 ± 4.4 kg body weight) were allocated randomly and equally to one of three treatments on the basis of age and weight. Treatments consisted of a basal ration without additives (control, T1) or the basal ration with added live dried baker's yeast (LDY; saccharomyces cerevisiae) 5g/calf/d, (T2) or with Diamond v"xp" yeast culture (DVYC; saccharomyces cerevisiae) 40 g/calf/d (T3). Treatment period lasted 9 months. They found that CF, NFE and OM digestibility was similar for live dried baker's yeast "LDY" and "DVYC" fed groups; being improved (p<0.05) relative to the control CP digestibility was the best with the "DVYC"-fed group followed by "LDY" group and finally was the control (p<0.05), while EE digestibility was not affected by treatment.

Miller et al.,(2002) conducted a continuous study to evaluate the effect of two different yeast cultures on ruminal
microbial metabolism. Treatments were; a) control lactation ration, b) yeast cultures 1(YC1) diamond –vxp and C) yeast culture 2(YC2-A-max). Each supplement was fed at an equivalent of 57 g /head day. Results obtained showed that ruminal culture treated with YC digested more protein and contributed less by-pass N than the control. Supplementing YC2 resulted in a tendency for higher microbial N synthesis / kg digested DM than YC 1.

Mohesn and Tawfik (2002) used fifteen six month old male Angora goats. Animals were offered rations that consisted of concentrate mixture (CM) and (3%) ureated rice straw .Urea treated rice straw (UTRS) was offered ad libitum. Bentonite was mixed with the (CM) before feeding at the rate 0, 2.5 and 5% .Results obtained showed that Bentonite significantly increased(p<0.05) DM, OM and CP digestible.

El –Ashry et al., (2003) fed lambs 3 types of rations. Group (1) received the control ration .The control ration consisted of 40% berseem and 60% concentrate mixture which contained 30% brewers grains by–product, 30% date seed, 20%soybean meal, 10% olive pulp and 10%molasse.Ration (2), lambs received control ration with 20mg flavomycin; Ration (3), lambs received control ration with 5gm saccharomyces cerevisiae. They found that (TDN)
and (DCP) intake (g/kg BW or g/kg BW $^{0.75}$) were not significantly affected with flavomycin or yeast supplementation compared with control lambs. Digestibility and nutritive values of different rations showed that DM digestibility were not different for sheep fed flavomycin (R2) or yeast (R3). However, EE digestibility was reduced in lambs fed flavomycin compared to those fed yeast, but the difference was not significant.

El-Basiony et al., (2003) used male buffalo calves to compare the effect of Pro-Bio-fair, panacure and flavomycin supplementation. Experimental animals were distributed into four groups and were individually fed twice daily (2.5% of their LBW) a concentrate mixture without (control-group) or with Pro-Bio-fair (Pro-Bio-fair group), panacure (pana-group) or flavomycin (flav-group) Results obtained indicated that values of in vivo digestibility of DM, OM, and CP were not affected by either Pro-Bio-fair or flavomycin supplementation however, CF digestibility was improved (p<0.05) by flavomycin supplementation.

Soliman et al., (2003) used five groups of Frisian cows in 5 nutritional treatments; (1) aflatoxin contaminated diet (control), (2) aflatoxin–contaminated diet with bentonite (3) ammoniated aflatoxificated concentrate feed mixture + aflatoxificated rice straw+bentonite ,(4) aflatoxificated
ammoniated rice straw and (5) contaminated concentrate feed mixture and ammoniated rice straw + bentonite. Results obtained showed that feeding ammoniated concentrate feed mixture supplemented with bentonite increased (p<0.01) the digestibility of all nutrients and rations feeding value.

Marghany et al., (2005) used sixteen lactating buffalo cows in four similar groups to investigate the effect of using different levels of \textit{(Saccharomyces cerevisiae)} , 0,5,10 and 15 gm /head /day . Animals were fed the experimental rations as follows:

Ration (1) control ration (70%SE and DCP of the daily requirements from concentrate feed mixture) CFM+ whole corn silage (WCS) ad lib.
Ration (2) control ration + 5 g \textit{saccharomyces cerevisiae}
Ration (3) control ration + 10 g \textit{saccharomyces cerevisiae}
Ration (4) control ration +15 g \textit{saccharomyces cerevisiae}

Results obtained revealed that rations supplemented with \textit{saccharomyces cerevisiae} (R2, R3 and R4) showed higher (p<0.05) digestibility of most nutrients than the control group (R1). The nutritive values as TDN and DCP showed the trend of digestibility similar to that of ration 3.

2.3: Effect of bentonite and growth promoters on growth performance:

2.3.1: Feed intake:
Fisher and Mackay (1983) formulated a basal ration containing grain mixture 10%, grass silage 45% and maize silage 45%. In the first trial the basal diet was supplemented with 0, 0.6 or 1.2% bentonite (12 lactating Holstein cows for 28 days test period). They found that bentonite did not improve DM intake. In the 2nd trial, a mixture of approximately 30% grass silage and 70% maize silage was supplemented with either 0.8% NaHCO3 or 2.1% bentonite or left without supplement (on 15 cows for 28 days treatment period). Comparing with the control cows, supplementation of bentonite had no significant influence on DM intake as compared with silage supplemented with bentonite. It was concluded that bentonite should not be used to supplement silage diets of lactating cows.

Bedo (1985) used male and female lambs given concentrates plus monensin. The author found that the feed intake of yearling rams given 14.4 mg monensin was reduced.

Malcolm and Kiesling (1990) found that intake of dry matter was not influenced by treatment when Hereford steers were offered concentrate 1) a basal grain mix. composed of ground barley and rice bran, 2) basal mix. With 10% whole cottonseed, 3) basal mix. with 1.6% live yeast culture and 4) basal mix. With 10% whole cottonseed and 1.6% lives yeast culture).
Schrijver et al., (1990) used 40 Belgian Blue bulls, about 352 kg and were freely given maize silage (period 1) then beet pulp (period 2) with flavomycin at 0 or 10 mg/kg. They found that average daily DM intake of flavomycin for treated animals was 39-46 and 51-54 mg with maize silage and beet pulp, respectively.

Erasmus et al., (1992) found that dry matter intake was greater in cows supplemented with 10 g/d yeast culture.

Anke et al., (1992) used growing males, and pregnant and lactating German improved white goats to be given semipurified diets, cellulose roughage and distilled water without or with Cadmium 5 mg/kg DM alone or with 3% Fenamin (bentonite, containing montmorillonite) over 56 days. They found that feed intake of entire males was 896, 908 and 909 g/day, respectively. Feed intake of female goats during 185 days (including 56 days of lactation) was 830, 586 and 790 g/day, respectively.

Waghorn et al., (1994) studied the effects of addition of salt (to provide 0.51% sodium) and 3.0% bentonite without or with Na (0.49% Na) to hay-based pelleted diets under conditions resembling those used for the shipment of live sheep. They found that addition of the salt to the diet had no effect on DM intake, but increased (p<0.01) water intake relative to the controls, with commensurate increase in
urinary output of more than 1 liter/sheep daily. The diet with bentonite plus salt increased (P<0.01) DM intake compared with the controls.

Robinson (1997) fed Holstein cows different basal diets that were supplemented or not with yeast culture preparations. No treatment differences were found in prepartum or postpartum dry matter intake (DMI).

Paduano et al., (1995) used thirty six female Merino sheep with average live weight 24.8 kg and fed ad libitum for 49 days on low quality roughage (50% chopped oat hay and 50% barley straw) plus Lupin (Lupinus angustifolius var. Uniharvest), cowpea (Vigna unguiculata var. Caloona) or navy bean seeds (Phaseolus vulgaris var. Actolac) (0, 10, 20 or 40 g/kg 0.75) without or with antibiotics (teramycin 15 mg/kg feed and flavomycin 30 mg/kg feed). They found that the intake of roughage was reduced by 19 and 48%, respectively when 20 and 40 g/kg (0.75) of all supplements were fed. Total DM intake increased (P<0.05) as the level of supplementation increased. Addition of antibiotics to the Lupin supplement increased DM intake, but did not affect feed conversion efficiency.

Singh et al., (1995). fed 12 rumen fistulated adult crossbred cattle for 37 days on ad-libitum wheat straw without (control) or with urea-molasses-mineral licks:
Ex; (15% urea, 45% molasses, 8% salt, 15% mineral mixture, 3% bentonite, 4% calcite powder and 10% cottonseed cake) and F, (Ex + 0.1% Farmore; a herbal extract) to lick. They found that the total daily DM intake and DM intake/100 kg body weight was significantly higher in cattle supplemented with Ex (4.75 and 1.91 kg, respectively) and F, mineral licks (4.58 and 1.86 kg, respectively) than in control cattle (3.44 and 1.4 kg, respectively). The average intake of the mineral licks was 498 and 386 g/day for Ex and F, respectively. The wheat straw intake of cattle fed on Ex and F mineral licks was 24.7 and 22.6% higher than the wheat straw intake of the control cattle.

Wohlt et al., (1997). divided cows into three feeding groups to be fed a mixture of corn silage + concentrate 1:1 plus 0,10 or 20 g/day of yeast. They found that yeast supplementation significantly improved DMI which was 23.8, 24.7 and 25.0 kg/day for the 3 groups, respectively.

Abdelmawla et al., (1998). used fifteen Baladi female goats with an average body weight of 27.27± 0.20 kg in a feeding trial for 12 weeks to evaluate the efficiency of using two levels of bentonite on milk production. Animals were divided into 3 experimental groups and were fed a daily basal diet alone (control) or with sodium bentonite 6 or 12 g/ head daily during 6 weeks in late pregnancy and 6 weeks after
parturition. The basal diet included 70% concentrate feed mixture, 15% berseem hay and 15% rice straw. The concentrate mixture contained 27.16% sunflower meal, 22% maize, 22.10% barley, 23.10% broiler litter and 5.64% wheat bran. Goats were offered their diet as 4% DM of body weight. They found that daily DM intake was not affected due to bentonite supplementation.

Gado et al., (1998). stratified by weight twelve growing male Egyptian Baladi goats (7 months old & 9.2 kg live weight), and assigned them to 3 experimental diets in an 84-day study. Dry yeast culture (YC, *Saccharomyces cerevisiae*) containing 108 cells/g was mixed with ground concentrate mixture (CM) at 0, 1 or 2 g YC/kg CM. Unsupplemented or YC-supplemented CM was fed individually and offered at 2.5% of body weight with ad libitum berseem (*Trifolium alexandrinum*) hay. They reported that supplementation with YC did not increase roughage hay intake, though it increased (P<0.05) crude fiber digestibility.

Soder and Holden (1998) used 36 multiparous and 12 primiparous Holstein cows in a completely randomized design to characterize the effects of feeding yeast cultures (*Saccharomyces cerevisiae*) and enzymes on dry matter intake, milk yield and composition. The prepartum diet consisted of a total mixed ration containing chopped grass
hay, corn silage, and grain pellet. The postpartum diet consisted of a total mixed ration containing corn silage, legume silage, chopped legume hay, and grain pellet. Treatments consisted of 1) whey control, 10g/d; 2) enzyme, 10g/d; 3) yeast +15g/d and 4) Biomate Yeast plus (20g/d; Chr. Hansen Bio systems, Inc., Milwaukee, WI). Least squares means for intake, milk yield, and milk composition were unaffected by treatment. Yeast cultures with or without enzyme had no direct effect on prepartum or postpartum dry matter intake or milk yield and composition.

**El-Badawi et al., (1998)** used 12 primiparous Egyptian Baladi does (18-20 months old & 21.4 kg live weight) and ranked them into 3 groups one week after kidding and allocated them to one of 3 rations containing dry yeast culture (YC) 0, 1 and 2 g/kg concentrate mixture (CM). Unsupplemented or YC-supplemented CM was fed at 2% (on a DM basis) of body weight with ad libitum berseem (*Trifolium alexandrinum*) hay. They found that YC supplementation increased (P<0.05) daily intake of hay by lactating does, but the higher supplementation level (0.2% YC) was accompanied by a decrease (P<0.01) in digestion coefficients for CP, ether extract, crude fiber and N-free extract.

**Walz et al., (1998)** studied the effect of replacing soybean
meal (SMB) protein with fish meal (FM) protein and slightly deficient in CP, with or without 0.75 sodium bentonite (NaB) on performance. Diets were based on maize, SBM and cottonseed hulls. In experiment 1, 5 lambs were assigned to each of the 3 dietary treatments (11% CP with 3% FM or 13% CP with 0 or 3% FM). Lambs fed diets that contained 11% CP with 3% FM or 13% CP with 0% FM. In experiments 2, 32 lambs were assigned to 4 dietary treatments (13.5% CP of DM) in 2x2 factorial arrangement (0 or 3% FM, and 0 or 0.75 NaB on as-fed basis). Their results showed that dry matter intake increased (p<0.05) by fish meal and sodium bentonite supplementation. Data obtained revealed that NaB increased (p<0.05) DMI.

**Dann et al., (1999)** used 14 primigravid and 25 multigravid Jersey cows. They were fed a total mixed ration pre- and postpartum that were either supplemented or not with YC at 60 g/d for approximately 21 d prepartum and 140 d postpartum. They found that the DMI was increased by YC during both the last 7 days prepartum (9.8 vs 7.7 kg) and during the first 42 d of lactation (13.7 vs 11.9 kg).

**Robinson and Garrett (1999)** used 26 multiparous and 18 primiparous Holstein cows to be fed prepartum and postpartum on total mixed diets that were, supplemented or
not with yeast culture (YC) for approximately 23 d prepartum and 56 d postpartum. They found that cows supplemented with YC achieved repeated diurnal feed intake patterns by approximately 14 d postpartum vs. 20 postpartum for unsupplemented cows.

Wang et al., (2000) assigned sixty Holstein cows to two treatments at 21 d before calving. The cows were fed a prepartum diet with or without yeast culture. After parturition, cows were individually fed one of five treatment rations for 140 d, (1) 21% forage without yeast culture, (2) 21% forage with yeast culture, (3) 17% forage without yeast culture, (4) 17% forage with yeast culture, and (5) 25% forage with yeast culture for 30 d and then switched to diet 4 for 110 d. Cows fed prepartum yeast culture were also fed yeast culture postpartum (60g). A quadratic increase to 25, 21 and 17% forage occurred during the first 30 d in daily intake milk (DIM). The authors found that no differences were observed for yeast culture or interaction of yeast culture and forage for first 30 DIM. Feeding 17 versus 21% forage tended to increase dry matter intake from 31 to 140 DIM during the first 30 days in milk.

EL-Ashry et al., (2001a) studied the effect of live dried baker’s yeast with or without acidification of milk and of yeast culture on performance of suckling buffalo calves.
Sixteen newly born buffalo calves were divided into four similar groups (4 calves each) according to weight and sex, which assigned randomly to four treatments (T). Tested groups were suckling calves on 3 liters of buffalo milk /calf/day without additives (control, T1), with added live dried baker’s yeast (Saccharomyces cerevisiae; 5g/calf/d (LDY; T2), with added yeast (Saccharomyces cerevisiae) culture Diamond V"XP" (40g/calf/day) (DVYC; T3) or with acidification of milk (just before feeding) by 1ml of an 85\% solution formic acid /letter addition of 5 g live dried baker’s yeast /calf/day (T4). All calves were offered a mash calf starter for ad libitum intake (as a group feeding). Results obtained indicated that DM intake of both milk and starter was reduced by 17.4 and 14.3\% due to addition of (LDY) to natural or acidified rearing buffalo milk, while it was reduced by 25\% due to (DVYC) supplementation, respectively as compared to the control.

El –Ashry et al. (2001b) studied the effect of live dried baker’s yeast and yeast culture on performance of growing buffalo calves. Twelve growing buffalo calves (6.31± 0.25 month old and 112.5± 4.4 kg body weight) were allocated randomly and equally to one of three treatments on the basis of age and weight. Treatments were consisted of a basal ration without additives (control, T1) or the basal ration with
added live dried baker's yeast (LDY; *Saccharomyces cerevisiae*) 5g /calf/d (T2) or with Diamond v"xp" yeast culture (DVYC; *Saccharomyces cerevisiae*) 40 g/calf /d(T3). Treatment period lasted 9 months. They found that DM intake did not change due to additives.

Allam et al.,(2001) found that yeast supplementation improved dry matter intake by sheep from ration, especially with the level of 2.5g/ head/day . Sheep used were fed experimental rations supplemented with three different levels of yeast (0, 2.5 and 5g/head/day).

Salem et al.,(2001) showed that daily intake of dry matter, organic matter and feed components were not significantly affected by the addition of 2 levels of sodium bentonite to the diet of sheep. The authors formulated the experimental rations as follows: control ration (T 1) consisted of a concentrate feed mixture plus berseem hay and rice straw.

1st tested ration (T2): T1+4% bentonite (of concentrate)
2nd tested ration (T3): T1+8% bentonite (of concentrate)

El–Basiony et al., (2003) investigated the effect of some growth promoters in rations for fattening Egyptian buffalo calves. Total number of 80 male buffalo calves (about 12-13
month) were used to compare the effect of Pro-Bio-fair, panacure and flavomycin supplementation. Experimental animals were distributed into four groups (20 heads each) and were individually fed twice daily (2.5% of their LBW) on concentrate mixture without (control-group) or with Pro-Bio-fair (Pro-group), panacure (pana-group) or flavomycin (flav-group). The calves were fed, also, on restricted amount of green sorghum during the first month of the experiment and on rice straw (ad lib). Results obtained indicated that calves of flavomycin group, consumed the lowest (p<0.05) amount of DM, while those of Pro-Bio-fair and panacure groups consumed the higher (p<0.05) amount than of the control group.

Schinoeth et al., (2004) used thirty–eight Holstein cows (26 multiparous and 12 primiparous) to evaluate feeding of yeast culture (60 g/cow daily of Diamond V "XP"). Total mixed diets on a (DM basis %) consisted of corn silage (28%), alfalfa hay (21%) and concentrate mix (51%) without or with the yeast culture. They found that feed efficiency defined as kilogram of ECM/kilogram of DM intake was improved by 7% for cows fed yeast culture.

Lesmesiter et al., (2004) reported that inclusion of yeast culture at 2% of the starter ration significantly increased starter and total dry matter intake when yeast (sacharimyces
S. cerevisiae) culture was added to calf starter 1.2% of dry matter.

Andrzej et al., (2004) found that addition of bentonite did not influence feed intake when dietary bentonite (2% additive) was given for 28 d together with traces of calcium chloride.

El-Tahan et al., (2005). studied the effect of adding tafla clay on performance of growing calves fed rations containing maize silage. Experimental diets were as follows; control ration (T1): concentrate feed mixture (CFM) + maize silage (MS) ad lib; Ration (T2) 60% of nutritional requirements from (CFM) + MS + 2% tafla ad lib; Ration (T3) 60% nutritional requirements from (CFM) + MS + 4% tafla ad lib. They found that tafla clay addition (T2&T3) improved DM intake.

2.3.2: Animal growth performance:

Al-Jassim and Mcmanus (1985) studied the value of yeast (S. cerevisiae) as a protein supplement for sheep. Three levels of yeast (Y1, Y2 and Y3) provided 24, 48 and 72 gm yeast crude protein (CP) /head /day, respectively and compared them with casein supplement given at the level of 90 g /head /day protected by formaldehyde (FTC) at 1.5g HCHO:100g casein. They showed that yeast supplementation at levels Y1, Y2 resulted in no significant stimulation to body
growth rate with a trend towards an improved body growth rate with Y3 level. Differences were not statistically significant, except that for "FTC".

Korniewicz et al., (1985) divided 60 Longwool male lambs (80 days old and 24 kg live body weight) into 4 groups of 15 each. Lambs were fed to 35 kg live body weight on a complete feed of ground barley, maize meal, grass meal and protein concentrate. Groups were not given or given salinomycin 25 mg, flavomycin 10 mg or salinomycin 25 mg for 4 weeks and then flavomycin 10 mg/kg feed. They observed that daily gain was without and with antibiotics 206, 255, 233 and 249 g, respectively.

Prior et al., (1986) studied the nutritional value of anaerobically fermented beef cattle wastes as a feed ingredient for livestock. Fermentor effluent (FE) or dried centrifuged biomass (DCB) was given to ewes and rams for 105 days. The FE diet plus bentonite was ensiled for 21 days before it was given to sheep. They found that average daily body weight gain (ADG) was unchanged, except in ewes given DCB and rams on DCB plus bentonite, in which ADG was decreased.

Aitchison et al., (1988) studied the value of feed additives (flavomycin and M 139603) for increasing live weight gains of sheep Merino wethers 9 months old with a mean initial
live weight of 28.9 kg were fed on wheat chaff or a pelleted mixture of lucerne, lupins and barley (6:2.5:1.5). Sheep were individually fed on either the control diets with no additives (n = 30) or diets containing flavomycin (F) 10 or 20, or M139603 (M) 5 or 10 mg/kg feed. Results obtained showed that live body weight gains were increased with both of F and M inclusion, by 11 and 12% respectively (P < 0.05).

Aitchison et al., (1989) used one hundred and eighty weaned Merino wethers weighting 29 kg and given ad libitum diets of wheat chaff or pellets containing lucerne 590gm, lupins 250gm and barley 150 g/kg feed without or with flavomycin 10 or 20, or tetronasin 5 or 10 gm/kg feed. They found that live weight gain was all higher in sheep given the pelleted diet compared with those given chaff. On the pelleted diet, flavomycin and tetronasin inclusion increased (P<0.001) live weight gains during the second 4-week period (296, 277 and 231 g/head daily) for flavomycin, tetronasin and the controls, respectively.

Murray et al., (1989) used two different sources of clays as feed additives in sheep rations. Each of the clays was included at a level of 25g/kg feed in two different diets, Half the sheep were fed wheat chaff at 900 g/d and the remainder fed a pelleted ration of lucerne:lupins:barley (600:250:150) at 3.5% of starting live weight (32kg). For each of the two
diets, nine Merino sheep were allocated to each Bentonite treatment group, and 12 to each of the two control groups (no bentonite). They found that none of the clays had any significant effect on live weight change.

**Murray et al., (1990)** studied the effect of bentonite on wool growth, live weight change and rumen fermentation in sheep. For 8 weeks, 78 Merino ewes about 20 months old were given a basal diet of pelleted lucerne, lupins and barley or chaffed wheat hay followed by a basal diet supplemented with one of 3 bentonite clays 25 g/kg diet for 9 weeks. They observed that the bentonite clays had 'nt effect on live weight change or wool growth in sheep given either the two basal diets.

**Schrijver et al., (1990)** used forty Belgian Blue bulls, about 352 kg, freely given maize silage (period 1) then beet pulp (period 2) with flavomycin 0 or 10 mg/kg. They found that dietary flavomycin increased growth by 1.4 and 15.2%.

**Bill and Wakeman (1991)** 2 growth stages studied the effect of flavomycin as feed additives during the on performance of growing steers and heifers. Flavomycin was fed at 0, 10 or 20 mg /d in a corn–mineral supplement offered at 1 lb/d. One hundred twenty steers and 80 heifers were assigned, with respect to breed–type and weight, to 20 groups. Twelve groups of steers were randomly assigned to
three pasture areas (blocks) with four treatments each. They found that gains for all cattle averaged 1.97 lb/d during the 96-d trial; Flavomycin fed at 5 and 10 mg/d had no effect on gains but 20 mg/d increased shrunk weight gains. (16 lb/d). As a general conclusion, flavomycin fed at 20 mg/d improved performance of cattle in this trial.

Ivan et al., (1992a) studied the effects of bentonite on wool growth and nitrogen metabolism in faun- a free faunated sheep. In experiment 1, Canadian Arcott rams, 4 to 5 months old from a fauna-free flock (FF), were left unfaunated or faunated via a stomach tube with a mixed population of ciliate protozoa (FD) and fed on maize silage based diets without or with 0.50% bentonite for 110 days. They found that daily gain was decreased (P<0.05) by bentonite supplement.

Wawrzychak et al., (1992) studied the effect of dietary flavomycin and avoparcin on milk yield and composition and some physiological indices in cows. From 60 to 305 days of lactation, 30 Black-and-White cows in 3 groups were fed on a control diet(1), supplemented with flavomycin 40 mg (2) or avoparcin 100 mg (3) compared with the control. They found that milk yield in groups 2 and 3 were higher by 12.9 and 10.0%, respectively; with higher milk fat, protein and DM contents and reduced milk somatic cell concentration. Body
weights of cows at the end of lactation increased by 2.9, 4.8 and 6.8%, respectively.

Anke et al., (1992) studied the effect of oral bentonite (Fenamin-R) on major and trace element incorporation in various tissues and milk of growing male, and pregnant and lactating German Improved White goats. The goats were given sempurified diets, cellulose and roughage and distilled water without or with Cadmium (Cd) 5 mg/kg DM alone or with 3% Fenamin (bentonite; containing montmorillonite) over 56 days. They found that average daily gain was 49, 46 and 39 g, respectively.

Paduano et al .,(1995).studied the effect of lupin (Lupinus angustifolius ) ,cowpea(Vigna unguiculata) and navy bean (Phaseolus Vulgaris) seeds as supplements for sheep fed low quality roughage .For 49 days, 36 female Merino sheep (average live weight 24.8 kg), were fed ad libitum on low quality roughage (50% chopped oat hay and 50% barley straw) plus lupin (Lupinus angustifolius var. Uniharvest), cowpea (Vigna unguiculata var. Caloona) or navy bean seeds (Phaseolus vulgaris var. Actolac) (0,10,20or 40 g/kg 0.75) without or with antibiotics (teramycin 15 mg/kg feed and flavomycin 30 mg/kg feed). They found that addition of antibiotics to the lupin supplement increased live weight gain.
Robinson (1997) studied the effect of yeast culture (*S. cerevisiae*) on adaptation of cows to diets postpartum. For approximately 14 d prepartum and exactly 14 d postpartum, 20 multiparous Holstein cows were fed different basal diets that were supplemented, or not supplemented with a yeast culture preparation. He found that cows supplemented with yeast culture lost less of body condition prepartum, which was consistent with numerically higher body weight gain.

El-Badawi *et al.*, (1998) used 12 primiparous Egyptian Baladi does (18-20 months old 21.4 kg average live weight), and ranked them into 3 groups a week after kidding to receive one of 3 rations containing dry yeast culture (YC) 0, 1 and 2 g/kg concentrate mixture (CM). Unsupplemented or YC-supplemented CM was fed at 2% (on a DM basis %) of body weight with ad libitum berseem (*Trifolium alexandrinum*) hay. They found that body weight decreased in all groups with advancing lactation period respective of (YC) supplement.

Walz *et al.*, (1998) studied the effect of replacing soybean meal (SBM) protein with fish meal (FM) protein in diets adequate and slightly deficient in CP, with or without 0.75% sodium bentonite (NaB) on performance of Suffolk lambs. Diets were based on maize, SBM and cottonseed hulls. In experiment 1, 5 lambs were assigned to each of the
3 dietary treatments (11% CP with 3% FM, 13% CP with 0 or 3% FM). They found that lambs fed diets that contained 11% CP with 3% FM or 13% CP with 0% FM had similar average daily gains (ADG). Gain was slightly improved by the 13% CP diet with 3% FM. In experiment 2, 32 lambs were assigned to 4 dietary treatments (13.5% CP of DM) in a 2 x 2 factorial arrangement (0 or 3% FM, and 0 or 0.75% NaB on an as-fed basis). The ADG was increased (P<0.05) by FM and NaB supplementation.

Dann et al., (1999) used 14 primigravid and 25 multigravid Jersey cows to be fed total mixed rations pre-and postpartum that were either supplemented or not with YC. The YC was a dried product that was top-dressed at 60 g/d for approximately 21 d perpartum and 140 d postpartum. They found that cows supplemented with YC lost body weight less rapidly postpartum than did non-supplemented cows, due to treatment by–day interaction.

Cabrera et al., (2000) studied the effect of *S. cerevisiae* (Sc; 0 or 10 g per day) and two protein supplements on the performance of steers grazing in a mixed pasture of tropical grasses during the dry season. 2kg of supplement (DM basis%) was offered daily (2.7-2.8% N) during the 90 days of the experiment. Nitrogen in supplements was administered from 100% Urea, or 50:50%
Urea and meat meal. Treatments consisted of grazing control group (CG), a group receiving 10g /per day SC (SC); and the supplements 100 and 50 U, with and without the yeast culture. Star grass (Cynodon plectostachyus) was the main grass of the diet (72.3%) followed by Paspalum conjugatum (14.4%), Brachiaria mutica (8.9%) and others (4.4%). They found that non supplemented steers had lower (p<0.01) average daily gain ADG (0.700 kg per day) than those supplemented (0.840 kg per day). Animal gain (ADG) was similar to supplements containing meat meal (0.865 kg per day) or Urea (0.815) without effects of Saccharomyces cerevisiae. In conclusion, Saccharomyces cerevisiae did not improve either animal performance or CF digestibility.

Salem et al., (2001) showed that average daily gain of lambs was 128.3, 185.7 and 153 g /head /day for T1, T2 and T3 respectively. Tested rations were; control (T 1) consisted of a concentrate feed mixture plus berseem hay and rice straw, (T2) consisted of T1+4%bentonite (of concentrate), (T3) consisted of T1+8% bentonite (of concentrate).

EL-Ashry et al., (2001a) studied the effect of live dried baker’s yeast with or without acidification of milk and of yeast culture on performance of suckling buffalo calves. Sixteen newly born buffalo calves were divided into four similar groups (4 calves each) according to weight and sex,
which assigned randomly to four treatments (T). Tested groups were suckling calves on 3 liters of buffalo milk /calf/day without additives (control, T1), with added live dried baker’s yeast (Saccharomyces cerevisiae; 5g /calf/d (LDY; T2), with added yeast (Saccharomyces cerevisiae) culture Diamond V”XP” (40g/calf/day) (DVYC; T3) or with acidification of the milk (just before feeding) by 1ml of an 85% solution fromic acid /letter addition of 5g live dried baker's yeast /calf/day (T4). All calves were offered a mash calf starter for ad libitium intake. (As a group feeding ). Results obtained indicated that daily gain was improved by 6.01 and 11.01 % due to addition of (LDY) to natural or acidified suckling milk, while it was increased by 3.5% due to DVYC inclusion, respectively, relative to the control.

El–Ashry et al., (2001b) studied the effect of live dried baker’s yeast and yeast culture on performance of growing buffalo calves. Twelve growing buffalo calves (6.31± 0.25 month old and 112.5± 4.4 kg body weight) were allocated randomly and equally to one of three treatments on the basis of age and weight during 9 months feeding period. Treatments consisted of a basal ration without additives (control, T1) or the basal ration with added live dried baker's yeast (LDY; Saccharomyces cerevisiae) 5g /calf/d (T2) or with Diamond v”xp” yeast culture (DVYC; Saccharomyces
cerevisiae) 40 g/calf /d (T3). They found that daily gain of DVYC-fed group was insignificantly improved relative to LDY–fed one. However, both the two additive groups were superior relative to the control group.

Mohsen and Tawfik (2002) studied growth performance of goat fed diets supplemented with bentonite. Fifteen, six month old male Angora goats, weighing 12.9 kg on the avg: were randomly assigned into three groups of five kids each in an 84 days feeding trial. Animals were fed rations that consisted of concentrate mixture (CM) and urea(3%) treated rice straw. Untreated rice straw (UTRS) was offered ad libitum. Bentonite was mixed for each group with the (CM) before feeding at the rate 0, 2.5 and . Result obtained showed that inclusion of bentonite increased (p<0.05) the daily gain of kids without a significant difference between bentonite groups (2.5 and 5%) in this respect.

El–Ashry et al., (2003) fed lambs 3 types of rations. (R1) received the control ration. The control ration consisted of 40% berseem hay and 60% concentrate mixture which contained 30% brewers grains by-product, 30% date seed, 20% soybean meal, 10% olive pulp and 10% molasse. Ration (2) lambs received the control ration with 20mg flavomycin; Ration (3) lambs received the control ration with 5gm *Saccharomyces cerevisiae*. They found that supplementation
of flavomycin to lambs (R2) attained the best average body weight and daily gain followed by (S. cerevisiae) group. In comparison with the control group.

El –Basiony et al., (2003). showed that growth rate was improved (p<0.05) by about 7.5% with panacur supplementation, while there was a slight increase (p>0.05) in growth rate when Pro-Bio-fair was added. In the same time, a negative response to flavomycin addition was recoded in male buffalo calves as compared to the effect of Pro-Bio-fair, panacure and flavomycin supplementation.

Lesmesiter et al.,(2004) studied the effect supplemental yeast (S. cerevisiae) culture on development and growth characteristics. Yeast (saccharomyces cerevisiae) culture was added to a texturized calf starter at 0 (control), 1 or 2% of dry matter. They found that average daily gain was improved by 15.6% with 2% yeast treatment. Daily change in hip height was also significantly greater for calves receiving 1 % (YC).The authors concluded that the addition of yeast culture in dairy calf starter at 2% enhances dry matter intake and growth.

Schingoeth et al., (2004) used thirty– eight Holstein cows (26 multiparous and 12 primiparous) to evaluate yeast culture supplement as a feed additive (60 g/cow daily of Diamond V
"XP") on production efficiency during hot summer. Total mixed diets on (DM basis %) consisted of corn silage (28%), alfalfa hay (21%) and concentrate mix (51%) without or with the yeast culture. They found that body weights and body condition scores were similar.

El-Tahan et al., (2005) studied the effect of adding tafla clay on performance of growing calves fed rations containing maize silage. Experimental diets were as follows; control ration (1) concentrate feed mixture (CFM) + maize silage (MS) ad lib; Ration (2) 60% of nutritional requirements from (CFM) +MS+ 2% tafla ad lib; Ration (3) 60% nutritional requirements from (CFM) +MS (4%tafla) ad lib. They found that feeding rations containing maize silage with 2 or 4% tafla improved daily body gain.

2.4: Feed conversion:

Bedo (1985) studied the growth promoting agents (Hungarian Simmental X Holstein-Friesian beef cattle) in fattening (monensin, flavomycin and salinomycin) and they found that sheep feed conversion rate improved in cattle given monensin and salinomycin. Feed conversion rate was almost the same in the flavomycin group as in the controls. Male and female lambs given a concentrate consumed less feed containing monensin, while female lambs were not influenced by the growth promoters.
Aitchison et al., (1988) studied flavomycin and M139603 as feed additives for increasing live weight gains and wool production. In Merino wethers 9 months old with a mean initial live weight of 28.9 kg were fed on wheat chaff or a pelleted mixture of lucerne, lupins and barley (6:2.5:1.5). Sheep were individually fed on either the control diets with no additives (n = 30) or diets containing flavomycin (F) 10 or 20, or M139603 (M)5or10mg/kg feed. They found an improvement in feed conversion efficiency when the additives were included. Feed conversion rations were as follows, (6.35, 5.53, 5.36 kg (P <0.05) feed/kg live weight gain for the controls, F and M, respectively.

Schrijver et al., (1990) used fourty Belgian Blue bulls, about 352 kg and freely given maize silage (period 1) then beet pulp (period 2) with flavomycin at 0 or 10 mg/kg. They found that dietary flavomycin improved feed conversion by 2.3 and 9.1% during the 2 growth stages.

Wawrzynczak et al., (1992) studied the effect of dietary flavomycin and avoparcin on milk yield and composition and some physiological indices in cows. From 60 to 305 days of lactation thirty Black and White cows in 3 groups were fed on a control diet (1) supplemented with flavomycin 40mg (2) or avoparcin 100mg (3) .They found that feed conversion efficiency per kg milk in groups given both additives was 12
% better than the control group (p < less or = > 0.05).

**Paduano et al., (1995)** studied the effect of lupin (*Lupinus angustifolius*) , cowpea (*Vigna unguiculata*) and navy bean (*Phaseolus Vulgaris*) seeds as supplements for sheep fed low quality roughage, for 49 days on 36 female Merino sheep. They found that addition of antibiotics to the lupin supplement did not affect feed conversion efficiency of female Merino sheep.

**Gado et al., (1998)** studied the effect of yeast culture supplementation level on the growth performance of growing Baladi goats. Dry yeast culture (YC, *S. cerevisiae*) containing 108 cells/g was mixed with ground concentrate mixture (CM) at (0, 1 or 2 g YC/kg CM). Un supplemented or YC-supplemented CM was fed individually and offered at 2.5% of body weight with ad libitum berseem (*Trifolium alexandrinum*) hay. They found that feed conversion in terms of total digestible nutrients (kg/kg gain) was improved in YC groups.

**Saleh et al., (1999)** studied the effect of bentonite supplementation to concentrate ration for lactating buffaloes. Eighteen lactating buffalo cows were divided into three groups for 12 weeks, 2 months after calving. Buffaloes were fed one of the following rations: I, concentrate + rice straw (control); II, ration I + 3% bentonite (of concentrate); III,
ration I + 6% bentonite (of concentrate). Bentonite clay and vitamin A, D3, and E premix were added to the concentrate. Results obtained indicated that (ME & DCP) utilization was improved by using bentonite. Economical efficiency increased by 12.7 and 15.6% and feed cost was decreased when bentonite was added to rations at 3 and 6% levels, respectively.

El-Ashry et al., (2001a) studied the effect of live dried baker’s yeast with or without acidification of milk and of yeast culture on performance of suckling buffalo calves. Sixteen newly born buffalo calves were divided into four similar groups (4 calves each) according to weight and sex. Tested groups were suckling calves on 3 liters of buffalo milk /calf/day without additives (control, T1), with added live dried baker’s yeast (S. cerevisiae; 5g /calf/d (LDY; T2); with added live dried (S. cerevisiae) culture Diamond V”XP” (40g/calf/day) (DVYC; T3) or with acidification of the milk (just before feeding) by 1ml of an 85% solution fromic acid /letter +addition of 5 g live dried baker's yeast /calf/day (T4). All calves were offered a mash calf starter for ad libitum intake. (as a group feeding). Results obtained indicated that feed conversion as (kg DM/kg gain) was improved by 25.53 and 28.79% due to adding LDY to natural or acidified rearing milk, while it was improved by 32.17% due to DVYC
addition, respectively.

El –Ashry et al. (2001b) studied the effect of live dried baker’s yeast and yeast culture on the performance of 12 growing buffalo calves for 9 months feeding period. Treatments consisted of a basal ration without additives (control, T1) or the basal ration with added live dried baker’s yeast (LDY; saccharomyces cerevisiae) 5g /calf/d (T2) or with Diamond v”xp” yeast culture (DVYC; saccharomyces cerevisiae) 40 g/calf /d (T3). They found that nutrients of (DM, TDN and CP) conversion of "(DVYC-fed group was insignificantly improved relative to LDY-fed group. However, both the two additive groups were superior relative to the control.

Mohesn and Tawfik (2002) studied growth performance of Angora goats fed diets supplemented with bentonite during 84 days feeding trial. Animals were fed rations consisted of concentrate mixture (CM) and urea (3%) treated rice straw . Ureated rice straw (UTRS) was offered ad libitum. Bentonite was mixed for each group with the (CM) before feeding at the rate 0, 2.5 and 5%. Result obtained showed that the addition of the bentonite to the ration of kids caused a significant improvement (p<0.05) in feed conversion efficiency. The nutritive value (%) expressed as TDN showed an increase in the treatment with bentonite in comparison
Marghany et al., (2005) studied the performance of 16 lactating buffaloes fed rations supplemented with different levels of baker’s yeast (*S.cerevisiae*). at (0, 5, 10 and 15 gm /head /day). Animal were fed the experimental ration as follows: Ration (1) control ration : 70% from SE and DCP of the daily requirements (*shehata,1970*) from concentrate feed mixture (CFM) + whole corn silage (WCS) ad libitum.  
Ration (2), control ration +5 g *saccharomyces cerevisiae*.  
Ration (3), control ration +10 g *saccharomyces cerevisiae*  
Ration(4), control rations +15 g *saccharomyces cerevisiae*.  
Results obtained revealed that rations supplemented with *saccharomyces cerevisiae* (ration 3) recorded the lowest feed cost /kg FCM and highest daily economic return (P.T) and economic efficiency.  

El-Tahan et al., (2005) studied the effect of adding tafla clay on performance of Friesian crossbred calves fed rations containing maize silage. Experimental diets were follows;  
control ration (1): concentrate feed mixture (CFM) + maize silage (MS) ad lib; Ration (2) 60% of nutritional requirements from (CFM) +MS+ 2% tafla ad lib; Ration (3) 60% nutritional requirements from (CFM) +MS (4%tafal) ad lib. They found that feeding ration containing maize silage with 2 or 4% tafla improved feed conversion and economic
efficiency.

2.4: Rumen parameters:

Ha and Emerick (1984) studied the effects of NaHCO3, limestone, and bentonite at 2% on feed intake, rumen fermentation, and blood mineral concentration of lambs changed abruptly from brome hay to a 92%-concentrate diet. They found that slight benefits regarding maintenance of rumen pH were obtained by adding NaHCO3 to the high-concentrate diet; buffers generally did not prevent the acidosis-related to changes in rumen lactic acid, or volatile fatty acids, as a result of giving high-concentrate diets.

Ha et al., (1985b) studied the effect of buffers and alfalfa hay on ruminal and systemic parameters of sheep fed high-concentrate diets. Lambs weighing an average of 35 kg were housed in metabolism cages to study the effect of bentonite, limestone, and NaHCO3 at 2% levels and lucerne hay at 10% added to all-concentrate lamb diets. Ruminal systemic parameters were measured during the onset of acidosis (phase 1). The effects of these buffering materials (lucerne omitted) on ration digestibility and mineral retention in addition to the ruminal and systemic parameters were investigated under the same conditions following a 20-day adaptation period (phase 2). They found that adding buffers or lucerne hay was effective in maintaining a more normal
ruminal pH and in preventing lactate accumulation in the rumen. In phase 2, the dietary buffers did not influence rumen pH, lactate, total volatile fatty acids (VFA), individual VFA molar percentages, or mineral concentrations except K which was lower (P<0.01) in lambs fed on 2% bentonite.

Aitchison et al. (1986) studied the effect of bentonite clays on rumen fermentation and diet digestibility. The availability of 8 different types of bentonite clays to modify fermentation characteristics in vitro was studied. They found that inclusion of 2 of the raw clay bentonite and of bicarbonate significantly increased the pH of the incubation medium compared with the controls. Total volatile fatty acid concentrations did not differ significantly among treatments. The ratio of the molar proportions of propionate and acetate was decreased when bentonite was included for all treatments except for 1 of the raw clay bentonite and bicarbonate. In another trial, there was no significant difference in pH values between groups given diets without or with bentonite until day 8 when those given bentonite had significantly higher values than those not given bentonite; the group given bentonite had lower values of volatile fatty acids than the other group.

Aitchison et al., (1989) studied feed additives for increasing wool production from Merino sheep. For 8 weeks
one hundred and eighty weaned Merino wethers were given ad libitum diets of wheat chaff or pellets containing lucerne 590, lupins 250 and barley 150 g/kg feed without or with flavomycin 10 or 20, or tetronasin 5 or 10 mg/kg feed. They found that rumen volatile fatty acids (VFA) and ammonia concentrations were higher with the pelleted diet. Total rumen VFA concentrations were lower with flavomycin or tetronasin on both diets, and ammonia concentrations were lower with both additives on the pelleted diet and with tetronasin on the chaff diet.

**Murray et al., (1990)** studied the effect of bentonite on wool growth, live weight change and rumen fermentation in sheep. For 8 weeks, seventy eight Merino ewes were given for 9 weeks a diet of pelleted lucerne, lupins and barley or chaffed wheat hay followed by basal diet supplemented with one of 3 bentonite clays (25 g/kg diet). They found no effect of clays on rumen ammonia or volatile fatty acid concentration in sheep fed on wheat chaff. In sheep fed on the pelleted diet, 2 of the clay samples had increased molar proportions of acetate and decreased molar proportion of propionate compared with the controls.

**Stephenson et al., (1992)** studied the effect of molasses, sodium bentonite and zeolite on urea toxicity. Rumen-fistulated Peppin Merino sheep, were fed on diets containing
urea 8 to 25g, molasses 0 to 150 g and sucrose 0 or 100 g/day, 1 M acetic acid or 0 or 800 ml/day and sodium bentonite (montmorillonite clay) or zeolite (crushed clinoptilolite rock). They found that the partly hydrated urea / bentonite mix (about 1:1 bentonite: water ratio) delayed the increases in rumen pH and free ammonia concentrations. Bentonite mixes, in either fully hydrated or fully dehydrated states, and zeolite mixes had no significant effects. The results support the positive role of a stable acid pH in the rumen for ensuring safe urea supplementation.

Ivan et al., (1992a) studied the effects of bentonite on wool growth and nitrogen metabolism in fauna-free and faunated sheep. In experiment 1, Canadian Arcott ram lambs, from a fauna-free flock (FF), were left unfaunated or faunated via a stomach tube with a mixed population of ciliate protozoa (FD) and fed on maize silage based diets without or with 0.50% bentonite for 110 days. In experiment 2, rumen cannulated Canadian Arcott wethers, faunated and fauna free were fed on maize silage based diets without or with bentonite for 21 days. In experiment 1, no effects of bentonite and no protozoa x bentonite interaction were noticed. In experiment 2, protozoa increased (P<0.01) rumen concentrations of ammonia and decreased (P<0.05) the acetic: propionic acid molar ratio. Fractionation of nitrogen
in the duodenal digesta flowing from the stomach to the small intestine showed that protozoa decreased (P<0.05) the flow of non-ammonia N and bacterial N, and there was a protozoa x bentonite interaction for these effects (P<0.05). The dietary bentonite supplement decreased (P<0.05) the flow of protozoal N and increased the flow of feed N (P = 0.17). It was concluded that the beneficial effects of defaunation or bentonite supplementation in faunated sheep was due to the improved supply of feed and bacterial protein to the intestinal tract.

**Febel (1993)** studied the influence of avoparcin, flavomycin and salinomycin on rumen fermentation in a 3 x 4 factorial arrangement with rumen-fistulated wethers given diets with roughage: concentrate ratios of 30:70, 50:50 and 70:30 for 16 days' adaptation and 2 days' measuring. He found that concentration of total volatile fatty acids in rumen fluid decreased when salinomycin or avoparcin were supplemented. Salinomycin and avoparcin significantly decreased acetic acid and increased propionic and isobutyric acids, regardless of concentrate: forage ratio. Flavomycin had similar effects only with the high concentrate diet. Salinomycin supplements decreased rumen ammonia concentrations significantly; flavomycin and avoparcin decreased rumen ammonia in high concentrate diets. The
feed additives had no effect on rumen fluid volume, dilution rate or rumen outflow rate.

**Baldi et al., (1994)** used two dry cows with rumen cannulae to be fed on a total mixed ration containing 20% maize silage, 80% meadow hay and urea 50 g for 56 days consisting of 4 period each of 14-day. In periods, 1 and 4 cows were fed on the control diet and in periods 2 and 3, on the control diet with 2.9% bentonite (DM basis). At the end of each period, rumen fluid was sampled for 2 consecutive days' different times. They found that bentonite slightly decreased rumen ammonia-nitrogen and total volatile fatty acid concentrations, and significantly increased molar proportion of butyrate. The post-feeding ammonia- N peak was reduced (P<0.1) by bentonite.

**Abdullah et al.,(1995)** used six 3-year-old sheep, each with a rumen cannula and were divided randomly into 3 equal groups and for 2 days they were fed on palm kernel cake 16% CP (PKC) or PKC + 2% bentonite (B, on DM basis) ad libitum, or left on pasture. Rumen fluid was sampled 3 times daily from all sheep. They found that rumen fluid pH and ammonia concentration were higher (P<0.05) in sheep at pasture than in those fed PKC or PKC + B. Rumen volatile fatty acid concentration was lower (P<0.05) in sheep fed on PKC than in sheep fed on PKC + B or at pasture.
There was a shift in fermentation patterns in sheep fed PKC or PKC + B towards higher propionate, isovalerate and valerate, and lower acetate.

Singh et al., (1995) studied the effect of supplementation of urea-molasses-mineral lick to straw diet on dry matter intake, volatile fatty acids and methane production. For 37 days 12 rumen fistulated adult crossbred cattle were fed on wheat straw ad libitum without (control) or with urea-molasses-mineral licks: Ex (15% urea, 45% molasses, 8% salt, 15% mineral mixture, 3% bentonite, 4% calcite powder and 10% cottonseed cake) and F (Ex + 0.1% Farmore, a herbal extract) to lick. They found that the total volatile fatty acid content was 35.7, 71.6 and 72.1 m mol/liter in control, Ex- and F-supplemented cattle, respectively. Cattle supplemented with Ex and F mineral licks had a higher proportion of propionate (22.3 and 23.1 vs. 18.2 m mol/liter) and a lower proportion of acetate (66.2 and 67.2 vs. 73.5 m mol/liter) than control cows. The percentage of methanogenic volatile fatty acids was higher in control cattle (81.8%) than in Ex- (77.8%) and F-supplemented cattle (76.9%). total gas production was significantly lower.

Ehrlich and Davison (1997) studied the effect of adding bentonite to sorghum grain-based supplements on cow milk production, and ruminal fermentation. Twenty four Holstein
cows were offered rolled sorghum grain at 8 or 10 kg/cow daily with or without 4% sodium bentonite. The design was a 4 x 4 Latin square with a 1 week adjustment period and a 3 week treatment period. This design was used to highlight the effects of high levels of grain feeding and changing the level of grain or grain-bentonite every 4 weeks. Cows grazed either ryegrass (*Lolium multiflorum* cv. *Tetila*) or oats (*Avena sativa* cv. *Cluan*) during the day and a mixed ration based on maize silage, lucerne hay, and meat and bone meal at night. They found that cows fed bentonite had a higher (P<0.05) rumen pH, tended to eat less grain sorghum and had lower concentrations of rumen ammonia.

Son *et al.*, (1998) subjected 3 Corriedale rams, to 3 treatments (control, 2% bentonite or 2% granite porphyry). Each test ram was fed on maize silage and concentrates in a 70:30 ratio (on a DM basis%) for 15 days. They found that pH values of rumen fluid were significantly higher (p<0.05) in sheep fed on 2% bentonite than in those fed no buffer or 2% granite porphyry. Higher rumen ammonia concentration was observed in the bentonite-supplemented group than in the control or granite porphyry groups. Molar percentage of acetate increased 2 h after feeding. Rumen acetate to propionate ratio was slightly affected by the addition of bentonite, though no significant difference was observed.
El-Badawi et al., (1998) studied the influence of dietary yeast culture on rumen fermentation of the lactating goats, in an 8-week feeding trial. Twelve primiparous Egyptian Baladi does, were ranked into 3 groups a week after kidding and allocated to one of 3 rations containing dry yeast culture (YC) 0, 1 and 2 g/kg concentrate mixture(CM). Unsupplemented or YC-supplemented CM were fed at 2% (on a DM basis) of body weight with ad libitum berseem (Trifolium alexandrinum) hay. They found that rumen fermentation had higher (P<0.05) butyric acid and lower (P<0.01) isovaleric acid, ammonia-N and acetate concentrations after 4 weeks of YC supplementation. However, YC supplementation did not influence rumen pH.

Gado et al., (1998) studied the effect of yeast culture supplementation level on some ruminal parameters of growing goats. Twelve growing male Egyptian Baladi goats, were assigned to 3 experimental diets in an 84-days feeding study. Dry yeast culture (YC, Saccharomyces cerevisiae) containing 108 cells/g was mixed with ground concentrate mixture (CM) at (0, 1 or 2 g YC/kg CM). Unsupplemented or YC-supplemented CM was fed individually and offered at 2.5% of body weight with ad libitum berseem (Trifolium alexandrinum) hay. They found that rumen pH, total volatile fatty acid production and molar proportions of acetate,
propionate and butyrate (after 4 h of feeding) were similar in all treatments. Molar proportions of isobutyric, valeric and iso-valeric fatty acids were 0.05 and 0.01 higher (P<0.01), respectively, in YC rations. Rumen micro-organisms were not influenced by YC supplementation, while the density of cellulolytic bacteria (rods) increased (P<0.05) in goats fed on YC 1 g. However, rumen NH3-N was lower (P<0.05) in YC-fed groups.

**Walz et al., (1998)** studied the effect of replacing soybean meal (SBM) protein with fish meal (FM) protein in diets adequate and slightly deficient in CP, with or without 0.75% sodium bentonite (NaB) on Suffolk performance and some ruminal parameters. Diets were based on maize, SBM and cottonseed hulls. In experiment, 32 lambs were assigned to 4 dietary treatments (13.5% CP of DM) in a 2 x 2 factorial arrangement (0 or 3% FM, and 0 or 0.75% NaB on an as-fed basis). They found that total rumen volatile fatty acid was increased by FM and NaB.

**Ivan et al., (2001)** reported that palm kernel cake (PKC) by-product, which contain relatively high levels of copper (Cu), may result in hepatic Cu accumulation in ruminants and in chronic Cu toxicity in sheep. Supplements of bentonite were efficient in alleviating accumulation of Cu in the liver.

**Varadyova et al., (2003)** determined the effect of addition
of silicate minerals, zeolite (Z) , bentonite (B) , kaolin (K) , granite (G) on the rumen fermentation parameters , total gas , methane , total individual volatile fatty acids (VFA's) and hydrogen recovery in rumen fluid inoculums from sheep. It was concluded that the silicate minerals had no appreciable effect on the methane production; however, they support the microbial metabolism by influencing (bentonite, granite) and slightly influencing (zeolite, kaolin) the rumen fermentation.

**Edwards et al.,** *(2005)* studied the influence of flavomycin on ruminal fermentation and microbial populations in sheep. In sheep receiving a mixed grass hay/concentrate diet, inclusion of 20 mg flavomycin day-1 decreased ruminal ammonia and total volatile fatty acid concentrations (P<0.001), but the acetate: propionate ratio was unchanged. Ruminal pH tended to be lower with flavomycin, and ammonia-production rates of ruminal digesta from control animals measured *in vitro* tended to be inhibited by flavomycin.

**2.5: Blood components :**

**Kuimov et al.,** *(1984)* studied the protein nutrition of fine –wooled sheep. Fine-wooled sheep were fed on a briquetted diet in which 15, 30 or 40% of the protein nitrogen was from sunflower oilmeal had been replaced by a urea concentrate or natural urea. The urea concentrate contained
urea 10, barley 75 and sodium bentonite 5%. The briquettes were made from barley 40, sunflower oil meal 7.5, steppe grass hay 40, coarsely ground barley 10.5%, plus elemental sulphur 1 g and CoCl2 4 mg/head daily. They found that the urea concentrate at 15 to 30% of protein N had no adverse effect on blood composition; at 45% it increased blood Hb value. Both urea concentrate and natural urea increased the functions of the pancreas and liver.

Dembinski et al., (1985) studied the effect of bentonite on the acid–base equilibrium in dairy cattle during the perinatal period. Three dairy herds (fifteen cows each) were fed on silages, straw and dried sugar beet pulp and given from about 200 days of pregnancy till 30 days after calving bentonite, 2% of ration DM (200-240 g daily). They found that blood pH in cows of different herds with and without bentonite was 7.36, 7.37 and 7.38, and 7.32, 7.32 and 7.34. Average gamma-globulins in colostrum were 118 and 72 g/liter, and carotenes were 6.25 and 3.85 mol/liter. Blood parameters in calves from dams with and without bentonite were: total protein 59.2 and 51.8, gamma-globulins 24.6 and 15.2 g/liter.

Wawrzynczak et al., (1992) studied the effect of dietary flavomycin and avoparcin on some physiological indices in cows. From 60 to 305 days of lactation 30 Black-and-White
cows in 3 groups were fed on a control diet (1), supplemented with flavomycin 40 (2) or avoparcin 100 mg (3). They found no significant differences among groups in blood composition or urine nitrogen concentration.

Piva et al., (1993) studied the effect of yeast on dairy cow performance, ruminal fermentation, blood components, and milk manufacturing properties. Holstein –Friesian cows were determined in a 6-wk experiment. The control diet (DM) consisted of 30% corn silage, 22% alfalfa hay, and 48% concentrate. After a-2 wk preliminary period, cows were assigned in equal numbers to 0 or 10 g/d of yeast culture. They found that blood plasma components were not affected adversely by added dietary yeast culture.

Zachwieja et al., (1997) studied the effects of incorporating the feed additives (flavomycin or toyocerin) into the rations of cows in the last 4 weeks of pregnancy. Cows which had received daily rations containing 40 mg flavomycin(Group2) or 1 g toyocerin (Group3de-ledivered from. They found high (p<0.05) correlation between total protein levels and immunoglobulin IgG, IgM and IgA levels in the blood serum of the calves.

Abdelmawla et al., (1998) studied the Productive performance and blood constituents of lactating goats fed diets supplemented with sodium bentonite. Fifteen
Baladi female goats were used for 12 weeks to evaluate the efficiency of dietary bentonite with 2 levels on milk production and some blood parameters. The animals were divided into 3 experimental groups and were fed a daily basal diet (control) or with sodium bentonite 6 or 12 g/head daily during 6 weeks in late pregnancy and 6 weeks after parturition. The basal diet consisted of 70% concentrate feed mixture, 15% berseem hay and 15% rice straw. They found that female goats fed diets supplemented with bentonite exhibited higher (P<0.01 or 0.05) levels of serum glucose, total protein, cholesterol, transaminase enzymes (GOT and GPT) and lower level of serum alkaline phosphates compared to the control goats.

El-Badawi et al., (1998) found that higher supplementation levels of YC led to higher (P<0.05) plasma urea-N, while total protein content in the blood was stable and comparable between groups in Baladi goats supplemented with YC at 0,1 and 2 g/kg concentration mix.

Saleh et al., (1999) studied the effect of bentonite supplementation to concentrate ration for lactating, buffalo and cows on some blood parameters. Buffaloes were fed one of the following rations:
I, concentrate + rice straw (control),
II, ration I + 3% bentonite (of concentrate),
III, ration I + 6% bentonite (of concentrate). They showed that haemoglobin, plasma protein, cholesterol, glucose, GOT and GPT increased (P<less or =>0.05) with bentonite.

Al-Ashry et al., (2001a) studied the effect of live dried baker’s yeast with or without acidification of milk and of yeast culture on performance and blood parameters of suckling buffalo calves. Sixteen newly born buffalo calves were divided into four similar groups (4 calves each) according to weight and sex, which assigned randomly to four treatments (T). Tested groups were suckling calves on 3 liters of buffalo milk /calf/day without additives (control,T1), with added live dried baker’s yeast (saccharomyces cerevisiae; 5g /calf/d (LDY;T2), with added live dried (saccharomyces cerevisiae) culture Diamond V”XP”(40g/calf/day) (DVYC;T3) or with acidification of milk (just before feeding )by 1ml of an 85%solution fromic acid /letter addition of 5 g live dried baker's yeast /calf/day(T4). Results obtained indicated that plasma total protein and globulin concentrations tended to increase, while plasma urea tended to decrease with each of the tested additives.LDY addition tended to increase plasma albumin and decrease plasma creatinine. Total cholesterol and calcium concentrations and GPT activity of plasma were not affected by treatments, while GOT activity and phosphorus level tended to decrease with
LDY addition.

El –Ashry et al., (2001b) showed that, DVYC; *Saccharomyces cerevisiae* inclusion in the rations increased (p<0.05) plasma total protein and globulin concentration relative to the other group Plasma albumin, A/G ratio, cholesterol and GPT were similar to the two additive groups (LDY & DVYC), respectively with a tendency to decrease relative to the control.

Salem et al., (2001) studied the effect of bentonite supplementation on some blood physiological parameters and performance of growing lambs. Used eighteen growing local male lambs of 7-8 moths and weighing average 25.1 kg. Animal were divided into three treatments. The experimental rations were as follow: Control ration (T1) consisted of a concentrate feed mixture plus berseem hay and rice straw. 1st tested ration (T2), T1 +4% bentonite (of concentrate), 2nd tested ration (T3), T1+8% bentonite (of concentrate). Blood constituents data showed that urea nitrogen, albumin, and GOT concentration decreased (p<0.05) significantly by the dietary supplementation of bentonite. On the contrary, globulin concentration in both of T2 and T3 (4 & 8 % bentonite) was increased (p<0.05) at 2 hr post treatment as compared with the control (T1).

Abd El-Baki et al., (2001) studied the effect of clays on
animal nutrition and some physiological blood parameters. Lambs were given four pelleted complete feed formulated with 2% urea (U), 2% urea + 3% tafla (UT), 2.5% urea plus 3% tafla (HUT) and the control feed without urea and tafla (C). They found that lambs fed urea plus tafla showed higher (p<0.01) haematological parameters, blood glucose, and mineral contents (Na, Cl, K and Ca) and lower urea-N, and GPT than urea without tafla. On the other hand, Mohsen and Tawfik (2002) reported that bentonite had no effect on cholesterol, glucose and hemoglobin in the blood serum of Angora goats. On the contrary, EL-Ashry et al., (2003) found that flavomycin (20 mg/h/d) and *Saccharomyces cerevisiae* (5 mg/h/d) increased (p<0.01) total protein, albumin, globulin, creatinine, total lipid triacylglyceride, GOT and GPT than control.

Soliman et al., (2003) showed that blood serum total protein, albumin and urea nitrogen values were decreased (p<0.01) by feeding aflatoxicficated diets, whereas, no significant differences in globulin and creatinine values were observed.

Rao et al., (2004) studied the effect of supplementing bentonite or activated charcoal on certain blood parameters of young goats fed diets with or without added aflatoxin
B1. The treatment groups were T1 (Basal ration), T2 (concentrate mixture supplemented with NaB at 2 kg per 100 kg), T3 (concentrate mixture supplemented with activated charcoal (AC) at 2 kg per 100 Kg), T4 (T1+AFB1 at 300 ppb), T5 (T2+AFB1 at 300ppb), T6 (T3+AFB1 at 300ppb). They found that NaB had a protective effect on serum urea concentration at the end of the experiment, whereas activated charcoal (AC) had a protective effect throughout the experiment. Non-significant (P>0.05) elevation of serum GOT (units/ml) at one month after the start of experiment in the case of T4 (81.73±8.81) and T5 (80.31±12.81) was observed compared to their respective controls.

2.6: Carcass quality:

Korniewicz et al.,(1985) divided 60 longwool male lambs into 4 groups of 15 each to be fed to 35 kg live weight on a complete feed of ground barley, maize meal, grass meal and protein concentrate; groups were not given or given salinomycin 25, flavomycin 10 or salinomycin 25 for 4 weeks and then flavomycin 10 mg/kg feed. They found that liver weight was 0.6, 0.74, 0.63 and 0.75 kg. Fat content in the carcass was 17, 20, 15.6 and 18.1%. Other carcass traits were similar.

Prior et al.,(1986) studied the effect of nutritional value
of anaerobically fermented beef cattle wastes as a feed ingredient for livestock. Growth and carcass traits of beef cattle and sheep fed fermentor biomass. Fermentor effluent (FE) or dried centrifuged biomass (DCB) was given to ewes and rams for 105 days. The FE diet plus bentonite was ensiled for 21 days before it was given to the sheep. They found that Carcass quality traits were not affected by dietary treatment.

Schrijver et al.,(1990) used 40 Belgian Blue bulls, about 352 kg, and freely given maize silage (period 1) then beet pulp (period 2) with flavomycin 0 or 10 mg/kg. They found that carcass yield after slaughter at 650 kg was not different among groups.

El–Basiony et al., (2003) used male buffalo calves to compare the effect of Pro-Bio-fair, panacure and flavomycin supplementation on some carcass trails. Results obtained indicated that relative values of dressing percentage (as % of fasting empty body weight) were about similar (49.5, 50.0, 49.4 and 50.3%) respectively. Meat: bone ratio was slightly higher (p>0.05) for calves fed on the three types of growth promoters than that of the control group.

MATERIALS AND METHODS

This study was carried out at the animal production experimental farm of the faculty of Agriculture, Al-Azhar
University, Assiut branch.

**Table (1) Composition of the experimental rations on (DM basis %).**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>control</th>
<th>R1 (DY)*</th>
<th>R2 (FL)**</th>
<th>R3 (Bent)**</th>
<th>R4 (Bent+DY)*</th>
<th>R5 (Bent+FL)*</th>
<th>Price L/Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFM*</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>46</td>
<td>950</td>
</tr>
<tr>
<td>Corn</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>800</td>
</tr>
<tr>
<td>Cot. Seed cake</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>1600</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>700</td>
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<tr>
<td>Limestone</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>700</td>
</tr>
<tr>
<td>Minerals mix</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7500</td>
</tr>
<tr>
<td>Vit mix.</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>20000</td>
</tr>
<tr>
<td>Sodium chloride</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>500</td>
</tr>
<tr>
<td>Bentonite**</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>400</td>
</tr>
<tr>
<td>1% DM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Yeast g/h/d</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>15000</td>
</tr>
<tr>
<td>Flavomycin mg/h/d</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>130000</td>
</tr>
<tr>
<td>Price / Ton of ration (L. £)</td>
<td>1093.5</td>
<td>1123.5</td>
<td>1097.4</td>
<td>1133.5</td>
<td>1163.5</td>
<td>1137.4</td>
<td></td>
</tr>
</tbody>
</table>

1- DY (dry yeast)  2- FL (Flavomycin)  3- Bent(Bentonite)

4- Bent +DY ( Bentonite +Dry yeast)

5-Bent + FL (Bentonite + Flavomycin)

*CFM = { Commercial concentrate feed mixture ( Undecorticated cotton seed cake, linseed meal, yellow corn ,rice bran, wheat bean , limestone and salt)}

** Sinai Manganese Company, Kasr El-El Nil, Cairo.

Thirty male local crossbred Ossimi x Barki lambs averaging 27.4 kg (ranging from 26.7 to 27.95 kg initial live body weight & 6-7 months old were randomly assigned into
six nutritional groups, each of 5 animals to receive one of the experimental rations presented in , (Table 1) through the period from 16th of November 2004 to 20th of May 2005 189 days period.

3-1-Experimental animals management:

The experimental animals were kept under the routine veterinary supervision through the duration of the experiment. Diets were given twice daily at 9.00 a.m and 5.00 p.m and any residues were collected and weighed throughout the experimental period and all animals had free access of clean water. Animals were weighed at the beginning of the experiment and thereafter at two week intervals till the end of the experimental period to calculate weight and feed intake. Feed intake was recorded throughout the experimental period and shrunk live body weight was recorded. Selling market price of kg live body weight in 2005 =16 L£/kg

3-2. Feeding regimen:

Animals in all groups were fed basal ration containing 46% concentrate feed mixture (CFM), 25% corn yellow(CG), 10% cotton seed cake(CSC), 15% wheat bran(WB), 2% limestone, 1% mineral premix mix., 0.5% sodium chloride ,0.5 % vit. Mix. (Table 1) and wheat straw ad lib (WS) plus green berseem (Egyptian clover) 2kg /h/d
till the end of the trial. The first group served as a control group (C), the second group (R1) received the basal diet (C) and supplemented with 2 gram *Saccharomyces cerevisiae* per animal/day, the third group (R2) received the basal diet (C) plus 30 mg flavomycin per animal/day, the fourth group (R3) received the basal diet plus 1% bentonite of the concentrate feed mixture, group five (R4) received the basal diet plus 1% bentonite of the concentrate feed mixture plus 2 grams *Saccharomyces cerevisiae* per animal/day, the last group (R5) received the basal diet plus bentonite 1% of the concentrate feed mixture plus 30 mg flavomycin per animal/day. Rations were offered ad lib and residuals were weighed daily.

**3-3: Digestibility trial and ruminal parameters:**

At the end of the experiment, digestibility trials were carried out owing to El-Shazly (1958), using 3 lambs from each group. Lambs were put in metabolic cages for 7 days preliminary period followed by another 5 days for collection of feces. Samples of ruminal fluids were collected before feeding, 3 and 6 hours post feeding using a polyethylene collecting tube. Rumen liquor was used to determine TVFA's concentration according to (Warner 1964), while NH3-N concentration mg/100ml was determined according to
(Abou-Akkada and El-Shazly 1964).

3-4: Chemical analysis:

Samples of feeds and faeces were analyzed for dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE), and ash contents according to A.O.A.C (1990). Nitrogen free extract (NFE) of feed and feces were obtained by difference.

3-5: Sampling and analysis of blood serum:

Blood samples were collected from the jugular vein of 3 animals of each group post feeding at the last day of the trial. Blood samples were centrifuged at 4000 r. p. m for 20 min and stored at -18°C till analysis. Serum total protein was determined as described by Domas (1975), while albumin according to Doumas et al., (1971). Cholesterol was assessed as described by Schmidt Nielsen (1964). Serum Aspartateaminotransferase (AST) and Alanineaminotransferase (AL) were determined as described by Reitman and Frankel (1957) and total lipids were determined as described by Postma and Stroes, (1968).

3-6: Slaughter studies:

By the end of the feeding period three fasted animals from each feeding group were chosen at random and
slaughtered . Animal were then skinned, evacuated and dressed. The hot carcass composition and lean tissue contents were found out . The shoulders of the carcass were separated together with the ribs and weighed . The hind quarters were also weighed separately and the offal organs i.e. liver, heart, kidneys with fat, spleen and lungs were also weighed and recorded.

3.7. Statistical analysis:

One–way analysis of variance was used to test the differences among the experimental groups . Means were separated by Duncan's Multiple Range test Winer , (1971) All statistical analyses were done using Proc ANOVA of statistical analysis system (SAS,1998).

RESULTS & DISCUSSIONS
4.1. Chemical analysis of the experimental rations (on DM basis %):

Data obtained in (Table 2) showed that different experimental rations had nearly similar constituents. Dry matter ranged between 93.28% and 93.62%; OM ranged between 88.98% and 90.18%; CP ranged between 14.85% and 16.41%; CF ranged between 20.37% and 21.58%; EE ranged between 3.91% and 4.14%; NFE ranged between 48.05% and 49.85% and Ash ranged between 9.82% and 11.02%.

Table (2): Chemical analysis of the experimental rations on (DM basis %):

<table>
<thead>
<tr>
<th>Item</th>
<th>DM</th>
<th>OM</th>
<th>CP</th>
<th>CF</th>
<th>EE</th>
<th>NFE</th>
<th>ASH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>93.28</td>
<td>88.98</td>
<td>14.85</td>
<td>20.37</td>
<td>3.91</td>
<td>49.85</td>
<td>11.02</td>
</tr>
<tr>
<td>R1- (DY)¹</td>
<td>93.5</td>
<td>90.04</td>
<td>16.18</td>
<td>21.50</td>
<td>4.13</td>
<td>48.23</td>
<td>9.96</td>
</tr>
<tr>
<td>R2- (FL)²</td>
<td>93.41</td>
<td>89.58</td>
<td>15.74</td>
<td>21.50</td>
<td>4.07</td>
<td>48.27</td>
<td>10.42</td>
</tr>
<tr>
<td>R3- (Bent)³</td>
<td>93.44</td>
<td>89.96</td>
<td>16.10</td>
<td>21.05</td>
<td>4.04</td>
<td>48.77</td>
<td>10.04</td>
</tr>
<tr>
<td>R4- (Bent+Dy)⁴</td>
<td>93.62</td>
<td>90.18</td>
<td>16.41</td>
<td>21.58</td>
<td>4.14</td>
<td>48.05</td>
<td>9.82</td>
</tr>
<tr>
<td>R5- (Bent+FL)⁵</td>
<td>93.39</td>
<td>89.94</td>
<td>15.79</td>
<td>21.28</td>
<td>4.04</td>
<td>48.80</td>
<td>10.06</td>
</tr>
</tbody>
</table>

1- DY (dry yeast)  2- FL (Flavomycin)  3- Bent (Bentonite)  
4- Bent + DY (Bentonite + Dry yeast)  5- Bent+FL (Bentonite + Flavomycin)

4.2. Digestibility coefficients and nutritive values of the experimental rations (DM basis %):

Dry matter digestibility (Table 3) of all rations was almost equal ranging between 79.60 ± 1.00 % in the control group and 80.87 ± 0.58% in R4, indicating insignificant difference among the different experimental rations. Nowar et al., (1993) Pulatov et al.,(1983) found that addition of bentonite to diets of calves at level of 3% of DM increased reactive surface areas of nutrients by promoting the action of digestive enzyme and increasing the area of contact with mucous membrane of the digestive tract.

As for organic matter, no significant differences were found between the control group (65.11±1.70%) and the other five treatments; although the value of the control group was slightly lower than the other groups.

Martin et al., (1969) reported that using bentonite at 4% and 8% levels in the ration of sheep did not affect OM digestibility. Similarly, Huntington et al., (1977) reported that bentonite (4 to 12%) had no effect on the digestibility of OM.

Table (3) Digestibility coefficients and Nutritive values of the experimental rations.

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>R1-(DY)</th>
<th>R2-(FL)</th>
<th>R3-(Bent)</th>
<th>R4-(Bent+DY)</th>
<th>R5-(Bent+FL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Control</td>
<td>R1-(DY)</td>
<td>R2-(FL)</td>
<td>R3-(Bent)</td>
<td>R4-(Bent+DY)</td>
<td>R5-(Bent+FL)</td>
</tr>
</tbody>
</table>
Crude protein digestibility (Table 3&fig 1) indicated higher (p<0.05) values in different experimental rations in compare with the control group (81.03%). Such result may indicate that, supplementing the experimental rations with different additives led to enhance CP digestibility. It was of interest to note also that, both of R1 (DY) and R4 (Bent +DY) showed, in general higher CP digestibility values in compare with the different experiment groups, including the control one. This result may indicate that (DY)
Supplementation improved rations CP digestibility. Yeast are known as rich source of vitamins, enzymes and other important nutrients and co-factors which make them attractive as digestive enhancers, since it alters feed performance and nutrients digestibility (Wohlt et al., 1991; El-Waziry et al., 2000 and El-Talty et al., 2001). Soliman et al., (2003) and Saleh (1994) reported that addition of 2.5 and 7.5% bentonite to the ration of lambs caused a significant increase (p<0.05) in the digestibility of CP.

Crude fiber digestibility (Table 3 & fig 1) indicated higher (p<0.05) values of treated rations in compare with the control group (52.53 %). However, no significant differences were detected among different experimental groups in CF digestibility. Although, it was noticeable that both of (DY) and (Bent) supplements improved CF digestibility(R1,R3 and R4), respectively. On the contrary, (FL) and (Bent +FL) showed lower insignificant CF digestibility values indicating to somehow, a slight negative influences of both the two additive materials on CF digestibility. Such result may indicate that flavomycin as a feed additive may negatively depreellulitic bacteria activity in the rumen. In general, different feed additives showed higher (p<0.05) CF digestibility values in compare with the control ration (no additives). The increased digestibility of
some nutrients e.g. CP, CF and EE in some of the treatments may be due to an increase in ruminal retention time and/or a decrease in ruminal turnover rate. Improvement in protein digestibility may be due to the stimulation of rumen proteolytic bacteria (Williams, 1989), while improving crude fiber digestibility may be attributed to increasing the number of rumen cellulolytic bacteria due to yeast supplementation (Williams, 1989 and Gomex –Iarcon and Hubber, 1990).

Ether extract digestibility data (Table 3) pointed out to higher improvement (p<0.05) in EE digestibility for different feed additives and for different rations in compare with the control group which showed the lower digestibility value (71.84%). However, both of (DY) and (Bent) supplements indicated higher insignificant digestibility values in compare with flavomycin supplement, which showed slightly lower EE digestibility values.
itrogen free extract of different rations (Table 3) did not differ significantly from the control group or between each other. It ranged between (64.04 ±1.19 %) in group 4 and (65.01 ±1.58 %) in group 3. **Mohesn and Tawfik (2002)** reported that bentonite did not have any effect on the digestibility of NFE. Similarly, **Ha et al., (1985a) and Saleh (1994)** mentioned that the inclusion of bentonite at the level of 2 and 4% to the ration of both lambs and steers did not significantly (p<0.05) affect NFE. Different types of growth promoters of sheep had no effect on the digestibility of NFE. **(El-Basiony et al., 2003)**
4.3. Nutritive values %:

Total digestible nutrients contents (Table 3& fig 2) did not differ significantly between the different experimental groups and the control one. Percentages of TDN ranged between (60.13 ±1.50%) in the control group and (63.38± 0.99%) in group 4.

No significant differences were observed among SE percentages of different groups. Starch equivalent percentages ranged between (47.29±1.56 %) in the control group and (49.97± 1.36 %) in group 3.

Digestible crude protein percentage value was not significantly different between different groups and the control, although the control group showed lower DCP percentage (12.06 ± 0.41%) than the other treatment groups. Digestible crude protein percentages ranged between (12.06±0.41%) in the control group and (14.01±0.63 %) in group 4. Addition of saccharomyces cerevisiae culture to sheep diets has improved the digestibility of DM, CP and hemicellulose which in turn led to increase degradability of protein and flow of microbial nitrogen from rumen to postruminal compartments, and this was reflected later on rations nutritive values. (Wiedmeler et al., 1987 and Newbold et al., 1990). Allam et al., (2001) reported that digestibility coefficients of dry matter and other nutrients in
sheep rations were significantly affected by adding yeast at a rate of 2.5 g/h/d, while the addition of tafla at 0, 2% and 4% to rations of male Friesian calves increased insignificantly the nutritive values of rations as TDN and DCP compared to the control one, (El-Tahan et al., 2005) Improvement in rations nutritive value may be due to increased digestibility of most nutrient when tafla was added to the rations.

On the contrary, EL-Ashry et al., (2003) reported that adding either flavomycin or saccharomyces cerevisiae as growth promoters to the diet of lambs had no significant effect on TDN and DCP value.
4.4: Rumen parameters:

4.4.1. PH:

Data presented in (Table 4&Fig3) showed higher PH value at 0 time (before feeding), however different experimental rations indicated higher (p<0.05) values in compare with the control group (6.62) Ration 4 (Bent +DY) indicated the higher insignificant PH value among different experimental groups and the control one. Three hours post-feeding, different experimental rations showed lower (p<0.05) PH values. However, R4 (Bent + DY) still maintain higher insignificant PH value in compare with different experimental rations and the control group. Six hours post-feeding, different experimental rations tended to have higher (p<0.05) PH values with advance of time of measuring (Table 4 & Fig 3). Data of PH values showed in general, higher (p<0.05) PH value before feeding, then it tended to decrease (p<0.05) 3 hrs post-feeding and gradually increase (p<0.05) 6 hrs post–feeding .It was of interest to note that different experimental rations showed higher insignificant PH values (more neutral) in compare with the control group.
Table (4) Effect of experimental ration additives on ruminal PH values:

<table>
<thead>
<tr>
<th>Time (hrs)</th>
<th>Item</th>
<th>control</th>
<th>R1 (DY)</th>
<th>R2 (FL)</th>
<th>R3 (Bent)</th>
<th>R4 (Bent+DY)</th>
<th>R5 (Bent+FL)</th>
<th>X ±SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>6.62 ±0.114</td>
<td>6.82 ±0.106</td>
<td>6.72 ±0.083</td>
<td>6.70 ±0.078</td>
<td>6.92 ±0.154</td>
<td>6.90 ±0.095</td>
<td>6.78 ±0.047</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>5.48 ±0.081</td>
<td>5.76 ±0.111</td>
<td>5.73 ±0.080</td>
<td>5.95 ±0.05</td>
<td>6.03 ±0.048</td>
<td>5.68 ±0.061</td>
<td>5.75 ±0.038</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>5.63 ±0.116</td>
<td>6.07 ±0.084</td>
<td>5.96 ±0.110</td>
<td>6.22 ±0.057</td>
<td>6.14 ±0.052</td>
<td>5.90 ±0.090</td>
<td>5.98 ±0.043</td>
</tr>
<tr>
<td>X±</td>
<td></td>
<td>5.91 ±0.115</td>
<td>6.22 ±0.103</td>
<td>6.14 ±0.097</td>
<td>6.29 ±0.070</td>
<td>6.36 ±0.094</td>
<td>6.16 ±0.113</td>
<td></td>
</tr>
</tbody>
</table>

A, b and c; Means with different small letters within the same row and capital letters within the same column are significantly different (p<0.05).

1- DY (dry yeast)  2- FL (Flavomycin)  3- Bent (Bentonite)
4- Bent + DY (Bentonite + Dry yeast)  5- Bent + FL (Bentonite + Flavomycin)

(El-shaer, 2003), showed that the mean value of PH was significantly higher with all rations supplemented with additives than that of the control.

However, (DY) alone or with (Bent) showed higher (p<0.05) PH values in comparison with different feed additives and at different measuring times. According to Walli(1994), yeast utilizes rapidly fermentable carbohydrates, reducing the production of lactate and thereby increasing rumen PH on high concentrate diets.

It was also worthy to note that supplementing feed ration with bentonite led to neutralize the ruminal PH value
(higher PH values ) in compare with both of Flavomycin and dry yeast . According to (EL-Saadany et al., 2003), bentonite might have temperate PH value in rations which had higher content of CFM.

Similar results were reported by Son et al., (1998) and Salem et al., (2001) who reported that PH values of rumen fluid were significantly higher (p<0.05) in sheep fed on 2% bentonite than those fed on no buffer or 2% granite prophry. According to different authors, supplementing concentrate rations in different species, e.g. buffalo calves and small ruminants with monensin, lasalocid, live dry yeast and different feed additives led to increase (p<0.05) ruminal PH values. (Ivan et al., 1992a; Quigley et al., 1992; Al-Attar 1998 and Khinizy et al., 2005). However, Ivan et al., (1992b) reported reverse results with bentonite supplement which showed lower (p<0.05) PH value in comparison with both of monensin and lasalocid feed additives.

As a general conclusion, supplementing concentrated rations with feed additives led to increase (p<0.05) the ruminal PH value i.e., being more neutralized in compare with no feed additives (the control group). Moreover, bentonite as a buffer additive led to improve ruminal PH value, being more temperate when added besides both of flavomycin and dry yeast.
4.4.2. Ammonia –N-concentration (mg/100 ml) :

Data presented in (Table 5&fig 4) showed lower (p<0.05) NH3-N concentration values at 0 time (13.44±0.3). Three hours after feeding, higher (p<0.05) NH3-N values were detected (23.16± 0.5), then it tended to decrease (P<0.05) 6 hrs post-feeding (17.11±0.5). However, insignificant NH3-N values were detected among different experimental groups at both the two measuring times (0 and 3 hrs post-feeding) due to supplementing the control ration with different feed additives. Although,different feed
additives led to increase insignificantly NH3-N value in comparison with the control group. Moreover, supplementing the control ration with bentonite besides both of DY and FL led to increase insignificantly NH3-N values. Six hours post-feeding, insignificant NH3-N value was detected among different experimental rations in comparison with the control group. However, addition of bentonite to the control ration or besides both of DY and FL improved NH3-N values in different experimental rations. El-Tahan et al., (2005) reported that lambs fed rations containing tafla at 0, 2% and 4% of ration increased (p<0.05) ruminal NH3-N concentration at 4 hrs post-feeding than the control. On the contrary, Walz et al., (1998) found that sodium bentonite supplement did not affect NH3-N in treated lambs at 0 and 0.75% level of ration. The insignificant NH3-N values detected in the present study may be referred to the lower percent of bentonite supplement used (1% of the concentrated feed mixture) of the control group.
Table (5) Effect of experimental ration supplements on ammonia –N concentration (mg/100m) of ruminal fluid:

<table>
<thead>
<tr>
<th>Time (hrs)</th>
<th>Item</th>
<th>Control</th>
<th>R1 (DY)</th>
<th>R2 (FL)</th>
<th>R3 (Bent)</th>
<th>R4 (Bent+Y)</th>
<th>R5 (Bent+FL)</th>
<th>±±SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>13.11</td>
<td>13.19</td>
<td>13.86</td>
<td>13.87</td>
<td>13.78</td>
<td>12.84</td>
<td>13.44</td>
<td>±0.776</td>
</tr>
<tr>
<td>3</td>
<td>21.77</td>
<td>±1.241</td>
<td>23.08</td>
<td>24.04</td>
<td>24.48</td>
<td>23.24</td>
<td>23.16</td>
<td>±0.670</td>
</tr>
<tr>
<td>6</td>
<td>16.02</td>
<td>±1.467</td>
<td>15.96</td>
<td>19.15</td>
<td>18.35</td>
<td>17.04</td>
<td>17.16</td>
<td>±1.076</td>
</tr>
<tr>
<td>±±SE</td>
<td>16.97</td>
<td>±1.091</td>
<td>17.63</td>
<td>19.02</td>
<td>18.87</td>
<td>17.71</td>
<td>±1.011</td>
<td>±0.998</td>
</tr>
</tbody>
</table>

1- DY (dry yeast) 2- FL (Flavomycin) 3- Bent (Bentonite)  
4- Bent+ DY (Bentonite + Dry yeast) 5- Bent + FL (Bentonite + Flavomycin)  
A, b and c ; Means with different small letters within the same row and capital letters within the same column are significantly different (p<0.05).

The positive role of bentonite supplement as shown by Kalivoda (1987) and El-Saadany et al., (2003) in adsorbing the excess of NH3-N in rumen liquor and releasing it at low concentration thereafter may be due to the higher percent of supplementation tested by other authors (2 – 8 %) of the concentrate portion of the ration.
On the other hand, and according to (Russell et al., 1991; Krause and Russell, 1996 and Wallace, et al., 2001), flavomycin would appear to have the ability to increase the amount of amino acids available in the animal or /and its effect on Gram –negative species bacteria in ruminal media.

4.4.3. Total Volatile Fatty Acids (meq /100 ml):

Data presented in (Table 6 &fig 5), indicated significant differences (p<0.05) among different experimental rations in TVFA's concentration due to time of sampling. Lower (p<0.05) TVFA's values within different tested rations at 0.0 time (8.44 meq /100 ml), increased (p<0.05) to as high as (10.27 meq/100 ml) 3 hrs post–feeding and then tended to decrease (p<0.05) 6 hrs post-feeding (8.99 meq /100 ml). Matching data of TVFA's (Table 6) and that of PH values (Table 4) indicated that the higher (p<0.05) TVFA's production 3 hrs post-feeding (10.27 meq /100 ml)
led to decrease PH value in different feed rations to almost 5.78±0.03 on the average. On the other side, the lower (p<0.05) TVFA 'concentration due to ruminal absorption mechanism and /or ruminal bacteria activity led to increase (p<0.05) the ruminal PH value to 6.02±0.4 (Table 4). However, different experimental rations within the same measuring time showed higher (p<0.05) TVFA's level at 0.0 time in comparison with the control ration.

Table (6) Effect of the experimental ration supplements on total volatile fatty acids (TVFA’s) concentration in ruminal fluid (meq/100ml):

<table>
<thead>
<tr>
<th>Time (hrs)</th>
<th>Item</th>
<th>control</th>
<th>R1 (DY)</th>
<th>R2 (FL)</th>
<th>R3 (Bent)</th>
<th>R4 (Bent+DY)</th>
<th>R5 (Bent+FL)</th>
<th>X ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>8.11±0.232</td>
<td>8.11±0.341</td>
<td>7.94±0.227</td>
<td>8.94±0.305</td>
<td>9.27±0.290</td>
<td>8.27±0.313</td>
<td>8.44±0.130</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>9.44±0.130</td>
<td>10.16±0.144</td>
<td>9.72±0.188</td>
<td>11.11±0.388</td>
<td>11.72±0.277</td>
<td>9.38±0.273</td>
<td>10.27±0.152</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>8.66±0.186</td>
<td>9.38±0.273</td>
<td>8.72±0.290</td>
<td>9.27±0.264</td>
<td>9.61±0.200</td>
<td>8.44±0.316</td>
<td>8.99±0.110</td>
</tr>
<tr>
<td>X ±SE</td>
<td></td>
<td>8.74±0.149</td>
<td>9.22±0.222</td>
<td>8.79±0.194</td>
<td>9.77±0.259</td>
<td>10.20±0.256</td>
<td>8.70±0.192</td>
<td></td>
</tr>
</tbody>
</table>

1- DY (dry yeast)  2- FL (Flavomycin)  3- Bent (Bentonite)
4- Bent+DY (Bentonite + Dry yeast)  5- Bent + FL (Bentonite + Flavomycin)
A ,b and c ; Means with different small letters within the same row and capital letters within the same column are significantly different (p<0.05).

Supplementing the control ration with different feed additives improved (p<0.05) TVFA’s production.
The role of live yeast cell was highest as a rumen microbial activity enhancer capable of influencing some aspects of rumen fermentation processes to increase the outcome of TVFA's production fortifying the total number of anaerobic bacteria, particularly cellulolytic bacteria and to plunge NH3-N, lactic acid and CH4 (Mustvangwa et al., 1992). Addition of bentonite to experimental rations increased (p<0.05) the improvement occurred in (TVFA's) production in rumen media. Such evident prevailed at different time of measuring and was more pronounced at both of 3 and 6 hrs post-feeding, except with FL group (Table 6 & Fig 5). According to, Mustvangwa et al., (1992); Van and Demeyer (1987); Salem and El-Shewy, (2000) and El-Tahan et al., (2005), the higher TVFA's concentration due to bentonite supplementation may be attributed to the ability of bentonite to improve digestibility of nutrients within the rumen in different ruminants and species. Similar results were respected with Khinizy et al., (2005) with the high levels of live dry yeast. On the other side, Flavomycin bioactive role in enhancing TVFA's production in different ruminates was explained by (Packett et al., 1966; Arieli and Sklan, 1985 and Michalet –Doreau et al., 2002); since flavomycin tented to shift the molar proportions in ruminal digesta to a
pattern more similar to that found in caecal and clonic digesta.

Yet, they added that the difference between ruminal and large intestinal digesta may reflect difference in substrates available for fermentation in the different segments of the digestive tract.

**Fig (5) Effect of the experimental ration supplements on total volatile fatty acid concentration (meq/100 ml)**
4.5. Effect of bentonite and growth promoter supplements on some blood serum components:

Average values of serum total protein, albumin and globulin in lambs fed different experimental rations are shown in (Table 7 & fig 6). Results however indicated insignificant differences (P < 0.05) in total serum protein among groups. Similar results were obtained by Lather, (1975), Abd El-Baki et al., 2001 and Salem et al., (2001), who showed that level of serum total protein was not significantly different between dietary treated and the control group when sheep were fed rations containing the basal diet plus 4 or 8% bentonite. This indicates that, they added, treatment with bentonite did not affect protein synthesis in liver and utilization of diet proteins.

The same trend was also observed by El-Gendy (1985) and Saleh (1994), who pointed out to considerable changes in serum protein concentration of calves fed urea-treated rations containing 0 or 4% bentonite. Reverse results were reported by El- Saadany et al., (2003), who showed that rations which contained bentonite caused lower total protein concentration in serum of lambs of the matched rations free from bentonite. While, El-Ashry et al., (2003), found that supplemented flavomycin or saccharomyces increased (P<0.01) total serum protein more than the control. The role
of bentonite in adsorbing toxic products of digestion and in decreasing the accumulation of toxic substances in body tissues and subsequently reducing the incidence of internal disorders would elevate the value of total protein which agree with Dunn et al. (1979) and McKenzie, (1991). Serum total protein consists mainly of albumin and globulin. They are the most availed groups of protein and carry out a wide variety of biological functions. The main function of albumin in blood is to act as a buffer and assist in ion transport and in particular, those of water insoluble vitamins and co–factors (Erwin, et al., 1961)

Albumin concentration in serum blood of experimental groups (Table7, Fig 7) indicated significant differences (P ≤ 0.05). As shown, higher albumin values were assessed in serum blood of R2 and R3 lambs and without significant differences with different experimental groups, except R5 which indicated lower (p≤0.05) albumin value (3.342 g/l). Similar results were obtained by El-Ashry et al., (2003), who pointed out to higher albumin concentration when flavomycin or Saccharomyces cerevisiae were supplemented to ration of sheep
Table (7) Effect of bentonite and growth promoter supplements on some blood serum components of experimental lambs:

<table>
<thead>
<tr>
<th>group</th>
<th>Control</th>
<th>R1- (DY&lt;sup&gt;1&lt;/sup&gt;)</th>
<th>R2- (FL&lt;sup&gt;2&lt;/sup&gt;)</th>
<th>R3- (Bent&lt;sup&gt;3&lt;/sup&gt;)</th>
<th>R4- (Bent+DY&lt;sup&gt;4&lt;/sup&gt;)</th>
<th>R5- (Bent+FL)&lt;sup&gt;5&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total protein (g/l)</td>
<td>8.012 ±0.188</td>
<td>7.833 ±0.207</td>
<td>7.635 ±0.178</td>
<td>7.944 ±0.18</td>
<td>7.851 ±0.366</td>
<td>7.817 ±0.225</td>
</tr>
<tr>
<td>Albumin (g/l)</td>
<td>3.941±0.145</td>
<td>3.962±0.181</td>
<td>4.323±0.14</td>
<td>4.184±0.146</td>
<td>3.893±0.289</td>
<td>3.342±0.13</td>
</tr>
<tr>
<td>Globulin (g/l)</td>
<td>4.071±0.114</td>
<td>3.871±0.128</td>
<td>3.312±0.182</td>
<td>3.760±0.142</td>
<td>3.958±0.118</td>
<td>4.075±0.248</td>
</tr>
<tr>
<td>A/G ratio</td>
<td>0.968±0.182</td>
<td>1.023±0.128</td>
<td>1.305±0.158</td>
<td>1.112±0.168</td>
<td>0.983±0.194</td>
<td>0.746±0.248</td>
</tr>
<tr>
<td>AST (un/l)</td>
<td>68.667±1.763</td>
<td>68.667±1.763</td>
<td>67.333±1.333</td>
<td>71.00±1.870</td>
<td>68.00±1.414</td>
<td>68.333±1.394</td>
</tr>
<tr>
<td>ALT (un/l)</td>
<td>45.00±1.500</td>
<td>44.00±0.44</td>
<td>40.333±0.44</td>
<td>42.333±1.452</td>
<td>41.667±1.615</td>
<td>43.333±1.878</td>
</tr>
<tr>
<td>Total lipid (g/l)</td>
<td>5.603±0.420</td>
<td>5.456±0.204</td>
<td>5.451±0.263</td>
<td>5.476±0.169</td>
<td>5.228±0.308</td>
<td>5.971±0.377</td>
</tr>
<tr>
<td>Cholesterol (mg %)</td>
<td>188.00±11.091</td>
<td>194.33±7.711</td>
<td>202.11±7.803</td>
<td>206.11±7.932</td>
<td>197.78±8.499</td>
<td>190.3±6.433</td>
</tr>
</tbody>
</table>

1- DY (dry yeast)  2- FL (Flavomycin)  3- Bent (Bentonite)  
4- Bent+ DY (Bentonite + Dry yeast)  5- Bent + FL (Bentonite + Flavomycin)  

A, b and c ; Means with similar superscripts do not differ (p≤0.05) from each other, otherwise they differ.
Fig(6) Effect of bentonite and growth promoter additives on serum Total protein in sheep

Fig(7) Effect of bentonite and growth promoter additives on serum Albumin in sheep
Globulin concentration in serum blood (Table 7, Fig 8) showed higher (p≤0.05) values in both of R5 (Bent+FL) and without significant difference with the control group i.e. 4.475 and 4.071 g/l, respectively. Different treated groups indicated lower (p≤0.05) globulin values, particularly R2 (FL). Such results are expected as globulin is the difference between total protein and the albumin values. Results of globulin concentration in the present study were the reverse to that reported by Khineizy et al (2005), who reported that the higher (P <0.05) concentration of globulin was recorded for rations supplemented with live dried yeast (LDY) or Gustor Natures (GN) compared with Unsupplemented ration (the control) of growing male buffalo calves.

![Graph showing effect of bentonite and growth promoter additives on serum globulin in sheep](image)
Albumin to globulin ratio indicated significant differences among different experimental groups. Flavomycin lambs showed the higher (p<0.05) A/G ratio, while R5 (Bent +FL) indicated the lower value (0.746).

As for liver enzymes AST and ALT in (units/l), data obtained in (Table 7, Fig 9 & 10) indicated insignificant differences among different experimental groups and both values were within the normal ranges reported by numerous others indicating negative influences of different feed additives on both the two liver enzymes. Such results may suggest that DY, FL or and Bent didn't have any positive indifferences on enhancing lambs performances (Table 7).

Data concerning AST and ALT may also pointed out to the healthy moderate self- excitation to the liver for excretion of transaminase liver enzymes for better metabolism. Contrast results were obtained by Farahat (1975), McKenzie (1991), Abdel - Hamid et al., (1999) and El-Saadany et al., (2003) who pointed out to higher increase in both the two liver enzymes due to the addition of Bent to experimental rations. However the present results, were in line with those reported by El-Ashry et al., (2001-a),Ibrahim et al.,(2002) and El-Shaer (2003),concerning rations supplemented with live dried yeast or Gustor Natures added to buffalo and sheep rations, which showed insignificant effect on liver enzymes.
Fig(9) Effect of bentonite and growth promoter additives on serum AST in sheep

Fig(10) Effect of bentonite and growth promoter additives on serum ALT in sheep
Hafez et al., (1983) and Abdel-Hamid et al.,(1999), stated that Got and GPT secretions are accelerators to the rate of metabolism and protein biosynthesis in order to meet the increased requirements to synthesis new tissues, while Saleh et al., (1999), found that GOT and GPT were increased \((p \leq 0.05)\) by addition of bentonite to cows' rations.

Data in (Table 7 & fig11) indicated that both of total lipids and cholesterol concentration were not significantly affected by addition of bentonite or and dry yeast and flavomycin. However, El-Ashry et al., (2003), found that total lipids were increased \((p<0.05)\), by adding of flavomycin more than the control, while the lowest value was noticed when saccharomyces was added to the ration. Similarly, Lather, (1975) and Abd El-Baki et al., (1992), showed that level of was not significantly affected by treatments (Flavomycin and Dry yeast). Mohsen and Tawfik (2002) showed that bentonite had no effect on cholesterol. On contrast, El-Saadany et al., (2003), showed that sheep fed rations contained bentonite had lower cholesterol values than sheep fed rations free from bentonite.
Fig(11) Effect of bentonite and growth promoter additives on serum Total lipids in sheep

Fig(12) Effect of bentonite and growth promoter additives on cholesterol in sheep
4.6. Effect of bentonite and growth promoter supplements on Animal performance:

Average values of total body weight gain, daily gain, feed intake, feed conversion and economic efficiency are shown in (Table 8 and figs 13,14 and 15).

Data indicated that growth promoters supplementation and bentonite slightly improved, total body weight gain and daily gain, although differences were not significant. The control group was of least performance compared to the other treatments. Improved weight gain with bentonite supplementation may be due to the ability of bentonite to improve digestibility of nutrients.
Table (8) Effect of the experimental rations additives on growth Performance of local cross-bred male lambs:

<table>
<thead>
<tr>
<th>Item</th>
<th>control</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. daily gain (g) and live body weight (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Av. Initial body weight</td>
<td>27.2</td>
<td>27.7</td>
<td>26.7</td>
<td>27</td>
<td>27.95</td>
<td>26.9</td>
</tr>
<tr>
<td>Av. final body weight</td>
<td>52.6</td>
<td>54.4</td>
<td>53.2</td>
<td>54.8</td>
<td>54.3</td>
<td>53</td>
</tr>
<tr>
<td>Total body weight gain</td>
<td>25.4</td>
<td>26.7</td>
<td>26.5</td>
<td>27</td>
<td>26.35</td>
<td>26.1</td>
</tr>
<tr>
<td>Av. daily gain</td>
<td>134</td>
<td>141</td>
<td>140</td>
<td>143</td>
<td>139</td>
<td>138</td>
</tr>
<tr>
<td>Avg. daily feed intake (kg/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM</td>
<td>1.600</td>
<td>±0.017</td>
<td>1.486</td>
<td>±0.006</td>
<td>1.473</td>
<td>±0.012</td>
</tr>
<tr>
<td>TDN</td>
<td>0.962</td>
<td>±0.002</td>
<td>0.942</td>
<td>±0.012</td>
<td>0.918</td>
<td>±0.010</td>
</tr>
<tr>
<td>SE</td>
<td>0.756</td>
<td>±0.016</td>
<td>0.739</td>
<td>±0.0103</td>
<td>0.719</td>
<td>±0.0143</td>
</tr>
<tr>
<td>DCP</td>
<td>0.193</td>
<td>±0.012</td>
<td>0.198</td>
<td>±0.0105</td>
<td>0.193</td>
<td>±0.0007</td>
</tr>
<tr>
<td>Feed conversion (kg intake /kg gain)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kg DM /kg gain</td>
<td>11.940</td>
<td>±0.129</td>
<td>10.539</td>
<td>±0.047</td>
<td>10.521</td>
<td>±0.085</td>
</tr>
<tr>
<td>Kg TDN/kg gain</td>
<td>7.179</td>
<td>±0.168</td>
<td>6.681</td>
<td>±0.090</td>
<td>6.557</td>
<td>±0.077</td>
</tr>
<tr>
<td>Kg SE/kg gain</td>
<td>5.642</td>
<td>±0.119</td>
<td>5.241</td>
<td>±0.074</td>
<td>5.136</td>
<td>±0.103</td>
</tr>
<tr>
<td>Kg DCP/kg gain</td>
<td>1.440</td>
<td>±0.001</td>
<td>1.404</td>
<td>±0.146</td>
<td>1.378</td>
<td>±0.099</td>
</tr>
<tr>
<td>Economic evaluation of experimental rations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of feed (£/kg)</td>
<td>1.093</td>
<td>1.123</td>
<td>1.097</td>
<td>1.133</td>
<td>1.163</td>
<td>1.137</td>
</tr>
<tr>
<td>Cost of kg gain (£)</td>
<td>13.050</td>
<td>11.835</td>
<td>11.541</td>
<td>11.463</td>
<td>12.107</td>
<td>11.748</td>
</tr>
<tr>
<td>Net revenue (£/kg gain)</td>
<td>2.950</td>
<td>4.165</td>
<td>4.459</td>
<td>4.536</td>
<td>3.893</td>
<td>4.251</td>
</tr>
<tr>
<td>%Economic efficiency</td>
<td>1.00</td>
<td>1.41</td>
<td>1.51</td>
<td>1.53</td>
<td>1.32</td>
<td>1.44</td>
</tr>
</tbody>
</table>

R1 = DY, R2 = FL, R3 = Bent, R4 = Bent + DY and R5 = Bent + FLA, b and c:

Means within rows with similar superscripts are not significantly (p<0.05 different, otherwise they differ. % Economic efficiency = net revenue for treated rations relative to the control ration
However, Shetawei, (1993) and Fayed, (2001), reported that body weight gain was not affected by yeast supplementations. Concerning the effect of yeast culture on animals productive performance of previous results are contradicting. Plomp (1994) and Mir and Mir (1994a) reported that yeast culture supplementation did not influence performance and carcass characteristics during fattening bulls. Salem et al., (2000) reported that growing cross-bred lambs given bentonite and dolomite showed an increased average daily gain. Similarly, Walz et al., (1998), found improvements in average daily gain of lambs by addition of sodium Bentonite at 0 and 0.75% of their ration. However, (Abdel–Hamid et al., 1999), found that high feeding level and Bentonite in rations improved growth rate of small ruminants. Rindsing and Schultz, (1970) and Huntington et al., (1977), reported that efficiency of nitrogen utilization could be increased with bentonite supplementation even with depression in apparent nitrogen digestibility. Khinizy et al., (2005), reported that live dry yeast (LDY) or Gustor Natures (GN) supplementation to the rations of growing buffalo calves improved total body weight gain and daily gain, although the difference from the control was not significant.
El-Basiony (1994), fed growing buffalo calves on ration supplemented daily with 32 mg Flavomycin /kg concentrate feed mixture which was very close to that tested in the present study and reported an increase (p<0.05) in growth rate by 12.5%.

4.6.1. Animal growth performance:

Data in (Table 7 &fig 14) showed that daily dry matter intake (DM) was higher (p<0.05) significantly in the control ration, with no significant difference among the other treated groups. However, daily intake in different feed terms pointed out that, addition of FL or / and Bent led to decrease the daily intake ,while a pronounced decrease was being noticed with FL +Bent ( R5) in different feed terms . i. e. 1.426, 0.891, 0.699 and 0.188 g /h/d . On the contrary (DY) supplement showed almost similar feed intake values

Likethat of the control group in terms of TDN, SE and DCP. Similar results were reviewed by Jaques et al., (1986), who reported that addition of bentonite decreased feed intake of dairy cows fed on pasture. The variation in dry matter intake among groups may be due to the type of diet and bentonite levels, as explained by the outhers. On the other hand Mohsen and Tawfik (2002), reported that daily dry matter (DM) intake was similar in all groups and was not affected by the addition of Bentonite 2.5 % and 5% of goats
ration. Concerning the effect of yeast culture on animals productive performance of previous results are contradicting. Plomp (1994) and Mir and Mir (1994 a) reported that yeast culture supplementation did not influence performance and carcass characteristics during fattening bulls. In addition (Muller et al., 1983), found that 2% sodium bentonite increased feed intake of young cattle fed high grain diets. Besong et al., (1996), Robinson, (1997) and Kung et al., (1997), found that dry matter intake and CP intake were not affected by yeast culture supplementation of cows. However, Raun et al., (1976) referred the primary effect on feed utilization, probably to shifts in efficiency of fermentation, increased propionionate and decreased acetate.

4.6.2. Effect of bentonite and growth promoters supplementation on feed conversion:

Data in (Table 8 & fig 15) showed that feed conversion in terms of dry matter intake per kg gain was significantly (p≤ 0.05) improved by the addition of both bentonite and the two growth promoters to the diet of lambs. Similar results were noticed in terms of starch equivalent where SE, TDN and DCP were improved (p≤ 0.05) significantly by addition of different feed additives in compare with the control group. Such improvement in feed conversion ration due to different feed additives may be referred to the positive role of such
supplements in improving nutrients digestibility, enhancing fermentation activity, enriching and or equalize the supply of digested nitrogen to the rumen microorganism, absorbing toxic metabolites in the rumen media and destroying the harmful microbes. Khinizy et al., (2005), reported that live dry yeast (LDY) or Gustor Natures(GN) supplementation improved feed conversion ratio expressed as (kg DM, and TDN/ kg gain) with the high levels of live dried yeast or Gustor than those at low levels, with no significant differences among treatments of growing male buffalo calves. Mohsen and Tawfik (2002), reported that addition of bentonite at two levels 2.5 and 5% of goats caused a significant improvement (p<0.05) in feed conversion efficiency. Abd El-Baki et al., (2001), found that feed conversion of ration of lactating cows was improved by adding tafla clay to cow rations, especially with 65% CFM group.

El-Saadany et al., (2003) showed that the two groups which received bentonite achieved the highest feed conversion as DM, TDN and DCP/kg daily body weight gain.
Fig(14) Effect of bentonite and growth promoters supplements on average feed intake of the fattened lambs

Fig(15) Effect of bentonite and growth promoter supplements on feed conversion of the fattened lambs (kg intake /kg gain)
4.6.3. Effect of bentonite and growth promoters supplements on economic evaluation:

Results of the economical evaluation of local cross-bred male lambs fed rations containing CFM, supplemented with bentonite or growth promoters (dry yeast and flavomycin) are shown in (Table 8 & Fig 15). Such results coincided with that of feed conversion values, as lambs consumed higher daily intake in different feed terms showed higher feed cost i.e. the control group, irrespective of the feed cost/kg ration consumed and probably due to the insignificant daily weight gain attained by the different feed groups. Hence, the net revenues L£/kg gain showed a reverse trend to that of feed cost/kg gain i.e., resulted in lower net profit value. And as a general conclusion, different feed additives groups showed lower feed costs and higher net profit values in compare with the control group. Such improvement in decreasing feed costs and increasing the net profit/kg gain was as higher as 1.53% for Bent (R3) to as low as 1.32 % for (R4) i.e. Bent +DY. Murzin and pesshkova,( 1989), found that final weight, total gain and average daily gain were higher (p<0.05) significantly, with ration supplemented with 4% bentonite which was more efficient than 8% bentonite in promoting growth in local lambs. However, Marghany et al.,(2005), reported that addition of 10 gm Baker's yeast
reduced feed cost /kg CFM and realized the highest daily economic return (PT) of dairy buffaloes. Similarly, El-Tahan *et al.*, (2005), reported that, addition of tafla to ration of Friesian calves led to decrease feed cost / kg gain and the rate of increase was opposite to the net profit values for the same treatments. Abd El-Baki *et al.*, (2001), reported that addition of tafla slightly decreased feed costs, although feed cost of the control ration was higher than that of other treated rations. Saleh *et al.*, (1999), and El-Saadany *et al.*, (2003) showed that the economic return in percentage was highest for lambs fed rations contained 3% bentonite. According to Galal, (1997) and Abdel-Hamid *et al.*, (1999) high feeding level and inclusion of bentonite improved the economic efficiency in sheep and calves.

4.7. Effect of bentonite and growth promoters on carcass quality:

Data presented in (Table 9) showed the effect of bentonite and different feed additives on lambs carcass characteristics. Results obtained indicated insignificant differences among different feed groups in fasted live body weight ,empty body weight and hot carcass weight of local crossbred male lambs in kg .However ,lambs of groups 1,2 and 3 showed insignificantly heavier fasted live body weight in compare with groups 4,5 and the control one . Empty body
weight as the difference between fasted live body weight and the full digestive system in (kg) pointed also to insignificant differences among different experimental groups, however, different treated rations indicated insignificantly higher, but insignificant empty body weight of experimental animals, in compare with the control groups. Likewise was that of the hot carcass weight in kg. It was worthy to note that lambs offered bentonite alone (R3) showed slightly higher values in different carcass traits. This result may point out to the positive influence of bentonite in improving digestibility of feed nutrients and its active role in increasing the propionate production, hence resulted in insignificant positive carcass traits. On the other hand, data of the full digestive system weight in kg indicated significant differences among different experimental groups. However, both of DY and flavomycin showed higher (p<0.05) values in compare with lambs of the control groups. It was also worthy to note that bentonite groups (R3, R4 and R5) had significantly lower (p<0.05) full digestive system wt in kg i.e. 60.to 70 % in compare with the control group. Such evidence may suggest that bentonite supplement might have an active role in enhancing and improving ruminal fermentation activity towards propionate production and in reverse direction to that of acetate production which in turn led to decrease
bentonite groups ruminal volume and consequently reduce the weight of the ingesta. Such evident was ascertained by that of ingesta weight (Table 9) which indicated lower (p<0.05) ingesta weight for Bentonite groups (R3, R4 & R5) in comparison with the control and both of DY and FL groups (R1 and R2). Both the two later groups indicated higher (p<0.05) ingesta weight (kg) in comparison with the bentonite groups. However, in different carcass traits investigated flavomycin group (R2) showed higher (p<0.05) full digestive system and higher (p<0.05) ingesta weight (kg). Weight of the empty digestive system (Table 9) indicated significant (p<0.05)

<table>
<thead>
<tr>
<th>Item</th>
<th>control</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
</tr>
</thead>
</table>


Table (9) Effect of bentonite and different growth promoters on lambs carcass characteristics

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasted body wt (kg)</td>
<td>58.66 ± 8.504</td>
<td>60.66 ± 10.06</td>
<td>61.33 ± 4.725</td>
<td>62.00 ± 12.7</td>
<td>59.33 ± 11.59</td>
<td>56.66 ± 13.012</td>
</tr>
<tr>
<td>Wt of the full digest system</td>
<td>10.83 ± 1.040</td>
<td>11.00 ± 1.732</td>
<td>13.33 ± 1.755</td>
<td>7.333 ± 0.57</td>
<td>6.333 ± 1.154</td>
<td>6.667 ± 1.154</td>
</tr>
<tr>
<td>Wt of the empty digest syst</td>
<td>3.33 ± 0.577</td>
<td>3.666 ± 1.154</td>
<td>3.500 ± 0.500</td>
<td>2.666 ± 0.28</td>
<td>2.333 ± 0.288</td>
<td>2.400 ± 0.173</td>
</tr>
<tr>
<td>Wt of the ingesta</td>
<td>7.500 ± 0.500</td>
<td>7.333 ± 0.577</td>
<td>9.833 ± 1.607</td>
<td>4.666 ± 1.162</td>
<td>4.000 ± 1.866</td>
<td>4.266 ± 1.078</td>
</tr>
<tr>
<td>Empty body weight (kg)</td>
<td>47.83 ± 8.098</td>
<td>49.667 ± 8.736</td>
<td>50.00 ± 4.821</td>
<td>54.667 ± 16.62</td>
<td>53.00 ± 10.440</td>
<td>50.00 ± 12.00</td>
</tr>
<tr>
<td>Weight of the Hind quar tus (kg)</td>
<td>10.73 ± 0.955</td>
<td>11.327 ± 2.050</td>
<td>10.510 ± 0.947</td>
<td>12.637 ± 2.996</td>
<td>12.697 ± 2.564</td>
<td>10.463 ± 2.017</td>
</tr>
<tr>
<td>% Dressing percentage</td>
<td>50.7 ± 4.089</td>
<td>52.41 ± 2.375</td>
<td>49.613 ± 0.499</td>
<td>50.013 ± 3.200</td>
<td>54.013 ± 6.049</td>
<td>47.967 ± 13.763</td>
</tr>
<tr>
<td>Lungs</td>
<td>0.466 ± 0.057</td>
<td>0.466 ± 0.028</td>
<td>0.636 ± 0.090</td>
<td>0.260 ± 0.065</td>
<td>0.273 ± 0.064</td>
<td>0.256 ± 0.060</td>
</tr>
<tr>
<td>Spleen</td>
<td>0.100 ± 0.050</td>
<td>0.070 ± 0.026</td>
<td>0.090 ± 0.100</td>
<td>0.096 ± 0.0057</td>
<td>0.93 ± 0.528</td>
<td>0.0633 ± 0.023</td>
</tr>
<tr>
<td>Liver</td>
<td>0.710 ± 0.101</td>
<td>0.700 ± 0.086</td>
<td>0.583 ± 0.028</td>
<td>0.476 ± 0.337</td>
<td>0.636 ± 0.077</td>
<td>0.570 ± 0.037</td>
</tr>
<tr>
<td>Kidneys</td>
<td>0.300 ± 0.132</td>
<td>0.283 ± 0.057</td>
<td>0.300 ± 0.050</td>
<td>0.463 ± 0.306</td>
<td>0.666 ± 0.404</td>
<td>0.583 ± 0.425</td>
</tr>
<tr>
<td>Heart</td>
<td>0.260 ± 0.655</td>
<td>0.250 ± 0.001</td>
<td>0.317 ± 0.025</td>
<td>0.260 ± 0.065</td>
<td>0.243 ± 0.040</td>
<td>0.246 ± 0.005</td>
</tr>
<tr>
<td>T. weight of the offal organs</td>
<td>1.836 ± 0.359</td>
<td>1.770 ± 0.138</td>
<td>1.926 ± 0.132</td>
<td>1.556 ± 0.658</td>
<td>2.210 ± 0.965</td>
<td>1.720 ± 0.494</td>
</tr>
<tr>
<td>% offal organ/carcass weight</td>
<td>7.653 ± 0.75</td>
<td>6.877 ± 0.464</td>
<td>8.127 ± 0.729</td>
<td>5.633 ± 1.391</td>
<td>7.510 ± 2.273</td>
<td>7.277 ± 1.913</td>
</tr>
</tbody>
</table>

Table (9) Effect of bentonite and different growth promoters on lambs carcass characteristics

A, b and c: Means within rows with similar superscripts are not (p≤0.05) different from each other.

*Empty body weight (kg) = (Fasted body weight – weight of full digestive system)
Values in different feed groups in favor of DY and FL groups and without significance with the control one. In contrast, different bentonite groups recorded the lower (p<0.05) empty digestive system weight in kg. Such results confirmed the previous us opinion towards the positive effect of bentonite, on enhancing ruminal activity and function for propionate production and its negative influences towards acetate production and fiber digestion mechanisms. Such feature led to decrease ruminal volumes and weight and in consequence ingesta weight in kg. Dressing percentage value (Table 9 and Fig 16) indicated significant differences among different experimental groups in such trait. However, R4 (Bent + Dy) showed higher (p<0.05) dressing value, but without significant differences with different treated groups and the control one. On the contrary, Bent, FL and FL +Bent showed insignificantly lower (p<0.05) dressing percent-ages. Such result may pointed out to the negative influences of FL as growth promoters on dressing percent-ages values. As shown in (Table 9 and Fig 16), such groups showed lower hot carcass weight in kg i.e 23.807 and 23.89kg and lower dressing percentages, i.e.49.613 and 47.967 kg, respectively in comparison with different treated groups and the control one. As for the weight of the fore shoulder and that of the hind quarters; there was insignificant
difference among different experimental groups in both the two feature traits.

However, the foreshoulders in general, indicated higher weight values in comparison with the hind quarter ones. It was also noticeable that the hind quarters represents about 75-80 % relative to the foreshoulders weight in kg .

Concerning the offal edible organs weight in kg., there were insignificant differences among different experimental groups in such organs weight, except lungs weight. Such result may indicate that, different feed additives didn’t have any significant effect on offal organs weight. In addition, weight of such organs showed a consistent weight relative to animals hot carcass weight and their fasted live body weight, except the lungs and the respiratory system .However, it was difficult to find out a positive correlation ship between lungs weight and either fasted live body weight or lambs hot carcass weight. Although , FL group showed higher (p<.05) lungs weight in comparison with different treated groups and the control one and that both of DY and FL groups had higher lungs weight , besides the control one in comparison with different Bent groups (R3, R4 and R5) which showed lower (p<0.05) lungs weight.
Percentage of edible offal organs relative to the hot carcass weight indicated insignificant differences among different experimental groups and the control one. Percentage of total offal organs represents on the average 7.5% of the hot carcass weight in general, which may indicate that offal organs had a consistent weight and percentage relative to the hot carcass weight, irrespective of male lambs fasted body weight, empty body weight, and hot carcass ones. Similar results were reported by EL-Bassiony et al., 2003 and Andrzej et al., (2004), who found that offals of the animals calves showed similar values indifferent
groups, irrespective of treatments and/or animals live body weight when use male buffalo calves.

4.8. Eye muscles chemical composition:

Data presented in (Table 10& fig 17) showed the chemical composition of eye muscle tissues for male lambs as influenced by different growth promoters and bentonite. Data obtained pointed out to significant differences (p<0.05) among different experimental animals in moisture content. However, the control groups showed higher (p<0.05) moisture content, but without significant differences with different treated groups, except the FL one, which showed the lower (p<0.05) percentage. Moisture content of the eye muscle for lambs aged 12-13 months represents almost 60% on the average. It is of interest to note that different feed additives, however didn't affect lean tissues moisture content. This result may suggest that moisture content of lean tissues had a consistent weight and was not influenced by the different feed additives included in the ration. Such moisture percentage is mainly related to animals age, rations composition, type of feed ingredients and the genetic constituent of the animals itself. Utilization of different growth promoters & Bentonite may probably had indirect correlation ship with tissues chemical composition but through its physiological roles on ruminal activity.
Table (10) chemical composition of eye muscle tissue for lambs fed bentonite and different growth promoters on (DM basis%):

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>R1- (DY)</th>
<th>R2- (FL)</th>
<th>R3- (Bent)</th>
<th>R4- (Bent+Dy)</th>
<th>R5- (Bent+FL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>60.65±</td>
<td>60.35&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>59.82&lt;sup&gt;b&lt;/sup&gt;</td>
<td>60.16&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>59.99&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>60.38&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±0.204</td>
<td>±0.231</td>
<td>±0.146</td>
<td>±0.167</td>
<td>±0.166</td>
<td>±0.335</td>
</tr>
<tr>
<td>CP%</td>
<td>18.57&lt;sup&gt;a&lt;/sup&gt;</td>
<td>17.69&lt;sup&gt;b&lt;/sup&gt;</td>
<td>18.34&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>18.06</td>
<td>18.34&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>18.22&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±0.174</td>
<td>±0.20</td>
<td>±0.182&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>±0.267</td>
<td>±0.294</td>
<td></td>
</tr>
<tr>
<td>EE%</td>
<td>19.65</td>
<td>20.05</td>
<td>20.51</td>
<td>20.68</td>
<td>19.67</td>
<td>19.91</td>
</tr>
<tr>
<td></td>
<td>±0.263</td>
<td>±0.314</td>
<td>±0.318&lt;sup&gt;c&lt;/sup&gt;</td>
<td>±0.673</td>
<td>±0.217</td>
<td>±0.155</td>
</tr>
<tr>
<td>ASH%</td>
<td>1.10&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>1.20&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>1.07&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.20&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>1.13&lt;sup&gt;abc&lt;/sup&gt;</td>
<td>1.25&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>±0.036</td>
<td>±0.040</td>
<td>±0.025</td>
<td>±0.061</td>
<td>±0.035</td>
<td>±0.043</td>
</tr>
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</table>

A, b and c different Percentage within rows with similar superscripts are not significantly different from each other, otherwise they differ significantly (p≤0.05).

Concerning CP %, data obtained pointed out to significant differences among different experimental groups. However, the control groups still maintained higher (p<0.05) CP % value i.e. 18.57 %, but without significant differences with different treated groups. Although, percentage of CP content in lean tissues of different treated animals represent 18% on the average in male lambs aged (12-13) months and an average 60 kg live body weight with 52 % dressing percentage and 25 kg hot carcass weight. Ether extract of lean tissues, indicated insignificant differences among
different experimental groups and represents 20% of the lean tissues at such age and fasted live body weight.

Ash contents of eye muscle (Table 10 & Fig 17) showed significant differences among different experimental groups and was as low (p<0.05) as 1.07% for FL group and as high (p<0.05) as 1.25% for R5 (Bent+FL). Such result may indicate that utilization of (Bent + FL) led to increase the ash contents of eye muscle indirectly. Different feed groups including the control one showed an intermediate ash values. However, ash content in lean tissues in such local crossbred male lambs aged 12-13 months and 60 kg live body weight contained 1.1%.

As a general conclusion; chemical composition of eye muscle tissues contained on the average; 60% moisture content, 18% CP, 20% EE and 1.1% ash. Utilization of different growth promoters additives and bentonite to CFM affected indirectly percentages of moisture, CP and ash contents, but not EE values. Flavomycin as growth promoters agent showed the lower (p<0.05) moisture and ash contents. In contrast, the control group lambs showed the higher (p<0.05) moisture and CP contents in percentages, while different feed group recorded intermediate chemical composition traits.
Fig(17) Effect of bentonite and growth promoter additives on chemical composition of eye muscle
SUMMARY AND CONCLUSION

This study was carried out at the animal production experimental farm of the faculty of agriculture, Al-Azhar University, Assiut branch.

The aim of the present study was to evaluate both of bentonite (Bent) and some growth promoters i.e. dry yeast (DY) and flavomycin (FL) on male lambs performance and carcass characteristics.

Thirty male local crossbred Ossimi x Barki lambs averaging 27.4 kg, (ranging from 26.7 to 27.95 kg initial live body weight) & 6-7 months old were randomly assigned into six nutritional groups, each of 5 animals to receive one of the following experimental rations.

1- The control group was fed a concentrate feed mixture (CFM)+wheat Straw(WS)ad lib+2 kg green berseem/h/ day (basal diet + control).
2 - The basal diet + 2g (Dry yeast) / head /day (R1)
3. - The basal diet + 30 mg Flavomycin (FL)/h/day (R2)
4 - The basal diet +1% Bent of the CFM (R3)
5 - R (3) + 2 gm DY/h/d (basal diet +Bent +DY) (R4)
6 - R (3) + 30mg (FL)/h/d. (basal diet +Bent +FL) (R5)

The concentrate feed mixture provides 12.0% DCP and 60% TDN, and rations were being altered at biweekly intervals according to the real changes in animals live body weight.
At the end of the study a digestibility trial was conducted using 3 animals/group. Samples of ruminal fluid were also collected from the same animals at 0, 3 and 6 hours after feeding to assess different ruminal measurements i.e. PH, TVFA’s and NH3-N concentrations. Blood samples were also collected from the Jugular vein of 3 animals /group to assay total protein, albumin, globulin, total lipids, cholesterol and liver enzymes .(i.e AST&ALT) in serum blood of the experimental animals. By the end of the fattening study 3 fasted live animals were slaughtered and dressed to investigate different carcass characteristics and to determine the chemical composition of animals lean tissues. Experimental rations digestibility and its Nutritive values were determined, while chemical analysis of different feed stuffs and residuals were determined. Animal performance in terms of live body weight gain, feed intake, feed conversion ratio, economic evaluation and carcass quality were also investigated.
**Results obtained indicator the following:**

1- Different experimental rations showed nearly similar constituents on (DM basis %). i.e. 93 % DM, 90% OM, 14-16% CP, 21% CF, 4% EE, 48.5% NFE and 10% ash on the average.

2- Different experimental rations indicated insignificant differences in DM, OM and NFE digestibility values.

3- Rations supplemented with different growth promoters and bentonite showed higher (p<0.05) CP, CF and EE digestibility values in compare with the control group. While, the addition of bentonite to the rations increased (p<0.05) EE digestibility values.

4 - The control group showed, in general the lower (p<0.05) digestibility values in different feed nutrients.

5 - Different experimental rations showed insignificant higher TDN and SE values in comparison with the control ration. i.e. 60-63% TDN and 47-49 % SE on average.

On the contrary, Different experimental rations showed slightly higher (p<0.05) DCP values in compare with the control group. However, addition of (bentonite) besides DY and FL supplements led to improve DCP values insignificantly in compare with both of DY and FL rations. The control groups recorded the lowest Nutritive values in terms of TDN, SE and DCP.
6- Different supplemented rations showed higher (p<0.05) ruminal PH values at different measuring times i.e before feeding , 3 and 6 hours post feeding i.e , being more neutral . However, such rations showed higher (p<0.05) PH values on average on compare with the control group.

7 - PH values showed in general higher (p<0.05) values at 0.0 time, and tended to decline (p<0.05), 3 hours after feeding and showed higher (p<0.05) increase at 6 hours post feeding, but lower (p<0.05) than the corresponding values at 0.0 time.

8- Values of ruminal NH3-N (mg/100 ml) showed insignificant concentration among different experimental rations before feeding (13.32 mg /100 ml), including the control one. However, it tended to increase (p<0.05) at 3 hours post feeding (23.07) and showed a lower (p<0.05) decrease (17.32mg/100 ml) at 6 hours post feeding.

9 - A significant NH3-N values were detected in ruminal liquid of different experimental rations at both 3 and 6 hours post feeding. However, different supplemented rations showed higher insignificant NH3-N values at both of 3 and 6 hours post feeding in compare with the control group; which indicated the lowest insignificant values at the different measuring times.
10 - Supplemented rations with both of DY and FL showed higher (p<0.05) insignificant NH3-N values, while addition of bentonite to the control rations improved insignificantly NH3-N values in rumen liquor, except the FL group.

11 - As for TVFA's values in rumen liquor of different experimental groups; showed lower (p<0.05) value before feeding (8.45 meq/100ml), then it tended to increase (p<0.05) to 10.26 meq /100 ml at 3 hours after feeding and declined (p<0.05) to (8.97 meq/100ml) at 6 hours post feeding.

12 - Different supplemented rations showed higher (p<0.05) TVFA's concentrations at 0.0 time in compare with the control group, while addition of (bentonite ) besides DY and FL increased insignificantly TVFA's production at 0.0 time.

13 - At both 3 and 6 hours post feeding different experimental rations showed higher (p<0.05) insignificant TVFA's production in comparison with the control group. While, addition of bentonite to both of DY and FL improved insignificantly TVFA's production in rumen liquor of experimental animals in both the two groups. However, the control group showed, in general the lowest (p<0.05) insignificant TVFA's values at the different measuring times.

14 - As for the effect of both of the two growth promoters and addition of bentonite on serum blood constituents concentration, showed insignificant differences among
different experimental groups in total protein, total lipids, cholesterol % and also in both the two liver enzymes (AST and ALT) units/l. However, different serum blood constituents were in the normal range for sheep species.

15 - Different experimental rations fed to local crossbred male lambs had significant differences (p<0.05) among groups in albumin, globulin and A/G ratios. However, FL group (R2) showed the highest albumin value, but without significant difference with different supplemented groups and the control, except R5 (Bent + FL) which showed the lowest (p<0.05), albumin value.

16 - Globulin (g/l) showed higher (p<0.05) values with (Bent + FL) group, but without significant difference with the control one. However, FL group (R2) recorded the lowest (p<0.05) globulin value (3.312 g/l).

17 - Albumin to Globulin ratio differed (p<0.05) significantly among groups, while FL group recorded the highest (p<0.05) A/G ratio (1.305), however the lowest globulin ratio (0.746) was recorded with (R5) and when bentonite was added to the control ration.

18 - As for the effect of experimental rations additives on growth performance of local crossbred male lambs; different experimental groups showed insignificant differences among
groups in initial live body weight, final live body weight and total gain in kg.

However, different supplemented groups with or without bentonite additives showed slightly higher insignificant final live body weight, total body weight gain and average daily gain. The control group showed in general, the lowest insignificant (p<0.05) growth performance values in different terms.

19 - Daily feed intake, however, differed (p<0.05) among different experimental groups in favour of the control one, which recorded the highest (p<0.05) intake and in different feed units i.e. DMI, 1600 g/h/d; TDNI, 0.962 g/h/d and SEI, 756 g/h/d, respectively. On the contrary, different supplemented groups showed insignificantly higher DCPI values, but without significant difference with the control group. Dry yeast group (R1) showed the highest DCPI value (0.198 g/h/d) and addition of bentonite to the control ration improved DCPI value to (200 g/h/d) and the intake of DCP showed a highest insignificant intake with bentonite +DY (203 /g/h/d).

20 - Feed conversion efficiency indicated significant differences among the different experimental groups in favour of the supplemented ones. Moreover, addition of bentonite to rations supplemented with DY and FL additives
improved (p<0.05) the feed conversion ratio. On the contrary, the control group showed the lowest (p<0.05) feed conversion ratio (11.94 kg DMI, 7.179 kg TDNI and 5.642 kg SEI /kg gain). While Bent group (R3) recorded the best feed conversion ratio in different feed intake terms, i.e. (10.118 kg DMI, 6.412 kg TDNI and 5.056 kg SEI per kg gain).

21-Feed conversion ratio in terms of DCPI /kg gain, showed insignificant feed conversion ratio among groups, however, the control group still recording the lowest insignificant value, while R5 (Bent +FL) showed the highest insignificant DCPI value/kg gain.

22- Economic evaluation of experimental rations indicated lowers feed costs /kg gain for different supplemented groups, either with or without bentonite addition; inspite of the higher feed cost /ton for the different supplemented rations. However, R3 (Bent) showed the lowest feed cost /kg gain (11.463 £ / kg gain), while the control group recorded the most expensive one (13.050 £/kg gain). The net profit value in £ /kg gain took a reverse direction to values of feed costs /kg gain, since R3 showed the highest net profit value /kg gain (4.536 £ /kg gain), while animals of the control group showed the lowest net profit value (2.95 £ /kg gain). And in general, different supplemented rations with or without
Bent showed higher economic efficiency percentage values in comparison with the control group, i.e. (1.41, 1.51, 1.53, 1.32 and 1.44 %) relative to the control group, in the same order of treatments.

23 - The effect of bentonite and different growth promoters showed insignificant differences among different experimental groups in fasted live body weight, empty body weight and hot carcass weight in kg, however there were significant differences among groups in dressing percentage value in favour of (Bent + DY), but without significant differences with different supplemented groups and the control one. Ration 5(Bent +FL) recorded the lowest (p<0.05) dressing percentage value (47.967%). Moreover, both of the two FL groups (R2 and R5) showed lower dressing percentage values in comparison with both of DY, Bent, Bent +DY and the control group.

24 - Offal edible organs weight was not influenced by (DY) and (FL) supplements, either with or without (Bent) addition to the control ration. Different offal organs however represented almost constant percentage relative to the hot carcass weight (7.5%) and didn't differ among groups due to ration supplements, animals fasted weight or animals hot carcass weight.
25 - Weight of the foreshoulders and hind quarters cuts was not also influenced significantly due to rations supplements, however the hind quarters cuts represents about 75-80% of the foreshoulders weight.

26 - Chemical composition of lean tissues indicated (p<0.05) differences among different experimental groups in moisture, CP and ash contents. However, the control group showed the highest (p<0.05) moisture (60.65%) and higher (p<0.05) CP contents (18.57%), with the lowest (p<0.05) insignificant ash (1.10%). Ether extract content of lean tissue didn't differ significantly among groups due to rations supplements. However, lean tissues of the slaughtered animals, irrespective of ration additives and carcass characteristics, contained showed in general 60% moisture, 18.5% CP, 20% EE and 1.1 ash, inspite of significance differences in moisture, CP and ash contents of different groups.

**General conclusion and recommendation:**

1- On the light of the present results it could be concluded that both of DY and FL increased (p<0.05) rations digestibility and nutritive values and the increase was more pronounced with bentonite addition, beside the two growth promoters.
2- Both of DY and bentonite showed improved positive influences on rumen liquor features, animals growth performances and feed conversion ratio. Both the two former supplements led to increase CP contents of the rations, reduced feed intake and maximize the net profit value and economic efficiency of production.

3- Different feed additives, especially DY and Bent showed, in general higher growth performances of the experimental animals.

4- Blood parameters were not influenced by such additives and experimental animals showed normal serum blood constituents which were in the normal ranges of the breed, since animals didn't suffer from any harmful or negative influences.

5- Although, there were significant differences among groups in carcass characteristics and lean tissue chemical composition, different feed additives didn't show any negative influences on carcass quality and lean tissues chemical composition.

6 - Flavomycin as a growth promoter showed inconsistent influences on animal performance, irrespective of its positive influences on ration nutrients digestibility and on the light of the present results, it was not recommended as a growth promoter agent.
**Recommendation:**

Owing to the present results, it is recommended to add both of dry yeast and bentonite to sheep rations as growth promoter agents. The positive effects of such additives in improving rations digestibility, nutritive values, and animal performance, favoured them as the more efficient ones from an economic and nutritional point of view.

It was also recommended to evaluate such additives, but with more variable ratios to attain the most optimum level which may lead to the most economic efficiency returns, particularly with rations of lower palatably and lower nutritive values.
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المختصر العربي

1- أجريت هذه الدراسة بالمزرعة البحثية لقسم الإنتاج الحيواني بكلية الزراعة – جامعة الأزهر – فرع أسوان.

2- استخدامت هذه الدراسة 30 حذاء ذكر مثلى (خليط أوسيم × برقي) بمتوسط وزن 27.4 كجم وتراوحت أعمارها ما بين 6-7 شهور في المتوسط 
- حيث قسمت هذه الحيوانات عشوائيا إلى 6 مجموعات غذائية (حوالي 189 يوم).

وقد كان الهدف من هذه الدراسة هو التقييم الغذائي لكل من البنوتايت (أحد معادن الطين) ونوعين من منشطات النمو المتناولة في الأسواق وهي: 
- الخميرة الجافة والفلاموسينس واثر استخدام هذه المنتجات مع أو بدون البنوتايت في العلاج على كفاءة اداء الحملان المسمى وخصائص الذبائح.

وكانت العلاج التجريبي المستخدمة كما يلي:

1- مجموعة المقارنة والتي غذت على مخلوط العلف المصنوع بنسبة 46% من العلف، 25% حبوب الذرة، 15 نخالة قمح، 10% كسب قطن مقشور، 2% حجر جيري، 1% مخلوط أملاح معدنية، 0.5% ملوث فيتامينات + ثين الفحم للشعاب بالإضافة إلى 2 كجم برسيم للرأس/يوم (العلاقة الأساسية).

2- العلاج الأساسية بالإضافة إلى 2 جم خميزة جافة للرأس/يوم.

3- العلاج الأساسية بالإضافة إلى استخدام 30 ملم فلاموسينس للراس/يوم.

4- العلاج الأساسية بالإضافة إلى 1% بنتوتايت من كمية العلف المركز المقدم للحيوانات يوميا.

5- العلاج رقم 4 + 2 جم خميزة جافة للرأس/يوم.

6- العلاج رقم 4 + 30 ملم فلاموسينس للراس/يوم.
3. كانت القيمة الغذائية للعلاقة الأساسية 12% بروتين خام موضوع
ودون% من كميات العلف المركز المقدّم للحيوانات مرة كل أسبوعين بدءاً على التغيير الحادث في معدل الاستهلاك
من عده، وكذا التغيير الحقيقي في وزن الجسم وذلك بمعدل مرة كل أسبوعين.
4. بفهامة التجربة تم إجراء تجربة تضمين على الحيوانات التجريبية على
حيوانات من كل مجموعة كما تم سحب عينات من سائل الكرش على نفس
الحيوانات عند أوقات زمنية متغيرة (قبل الأكل وبعد 3 و6 ساعات من
الأكل) لقياس بعض خصائص سائل الكرش (PH (درجة الحموضة) وال
vr. فريز.إكمية الاخماد الدهنية الطيارة).
5. تم سحب عينات دم من الوريد الو دجي لدى عدد 3 حيوانات من كل مجموعة لتقييم
بعض القياسات والتركيزات في سيرم الدم وكانت أهم المقاييس المقدرة في
سيرم الدم (البروتين الكلي، الربابين، الجلوبيلين، نسبة الربابين إلى
الجلوبيلين، الدهون الكلية، الكولسترول وتركيزات نسبة الكبد).
6. بفهامة التجربة تم اختيار 3 حيوانات تجريبية صائمة من كل مجموعة عشان
وتم ذبحها لقياس بعض خصائص الذبائح وكذا دراسة التركيب الكيميائي
للمكونات في اللحم في العضلة العضيفة من الضعنة الثالث عشر.
7. تم تقديم عمليات الهضم للمركبات الغذائية في العلائق المختبرة وتقدير
القيمة الغذائية لها مماثلة في محتواها من البروتين الخام المهموم، المركبات
الكلية المهمومة، معالج النشا، وكذا أجرى تقدير محتويات العلائق من
المركبات الغذائية (التركيب الكيميائي لها) وكذا المتبقية من الغذاء وكذا
التركيب الكيميائي للحمذبائح في الحيوانات المذبوحة.
8. أجرى تقييم كفاءة اداء الحملان المسمى من خلال تجربة حقيقية على
الحيوانات (خليط أوسيماعة X برقي) لمدة 189 يومًا من خلال قياس معدل
الزيادة الوزنية، معدل الماكول اليومي من الغذاء للرأس/يوم، كفاءة
التحول الغذائي وكذا التقييم الاقتصادي للعلاقق المختبرة، كما جرى أخذ مقاييس مختلفة على الذبائح وتمييزها وتقدير التركيب الكيميائي لها.

وقد أظهرت النتائج المتحصل عليها مايلي:

1- أظهر التركيب الكيميائي للعلاقق التجريبية المستخدمة فيما شبه متطابقة من حيث محتواها من مكونات مركبات الطعام المختلفة، إذ بلغت نسبة المادة الاجنة بها في المتوسط وعلى أساس المادة الجافة تماما 93%، المادة العضوية 90%، وتراوحت نسبة البروتينات الخام ما بين 14-16% بينما بلغت النسبة المئوية للألياف 21%، الدهن 4% والكربوهيدرات الذاتية 48.5%، بينما بلغت نسبة الرماد حوالي 10%.

2- لم تكن هناك فروق معنوية بين العلاقق المختبرة في القيمة الدهنية لكل من المادة البدنية والعضوية والكربوهيدرات الذاتية.

3- أظهرت الدراسة أن استخدام منشطات النمو و الببتونات، أو بدونه كان له تأثير معنوي عموما على رفع نسبة النمو البدنية للبروتينات الخام والألياف الخام والدهن الخام بالعلاقق، حيث أدت هذه الاضافات إلى القيمة الأساسية (المقارنة) التي رفع معدل هضم البروتينات الخام والألياف الخام معنويًا وأدى إضافة الببتونات إلى جانب منشطات النمو المستخدمة إلى زيادة نسبة التحسن الحاصل في معدلات الهضم للبروتين، الدهن والألياف الخام، وإن لم تكن الفروق معنوية. وقد كانت القيمة المقارنة هي الأقل معنويًا على الإطلاق في القيمة الدهنية لكل من البروتينات والدهن والألياف الخام.

4- أظهرت الدراسة عدم وجود تأثير معنوي لمنشطات النمو المحتملة للخبرة والفلاموماسين و الببتونات على القيمة الطاقية للعلاقق المختبرة مقارنة بالعلاقق القهارة. وتراوحت نسبة المركبات المحضومة الكلية بالعلاقق ما بين 60-63% وعند النشأ مابين 47-49% وان أدت إضافة الببتونات إلى العلاقق المختبرة والمحتوية على كل من الخبرة أو الفلاموماسين إلى زيادة محسوسه ولكن غير
معنوية على رفع القيمة الغذائية لمحتوى العلائق المختبرة من البروتين الخام المهموم بالمقارنة بالعليقة الأساسية والتي سجلت أقل قيمة غذائية حرارية وبروتينية بالمقارنة بالعلامة المختبرة وإن كانت الفروق غير معنوية.

5- أظهرت الدراسة ارتفاع معنوي في درجة الأس الهيدروجيني (PH) في العلائق المختبرة وفي جميع أوقات القياس سواء قبل الأكل أو بعد 3، 6 ساعات بالمقارنة بمجموعة الكنترول والتي مالت فيها درجة الأس الهيدروجيني في الاتجاه الحمضي.

6- كان لزمن القياس المأخوذ فيه العينات من سائل الكرش تأثير معنوي على درجة الـ PH - حيث مالت إلى الارتفاع قبل الأكل، ثم انخفضت بعد الأكل ب 3 ساعات ثم عادت لارتفاع مرتين ثانية بعد الأكل ب 6 ساعات ولكن بدرجة أقل من قيمتها قبل الأكل.

7- أظهرت الدراسة عدم وجود تأثير معنوي لكل من الخميره الجافة والفلافامايسيس وكذا البنزولين المضاف للعلائق بمفردة أو بالإضافة إلى منشطات النمو السابقة على درجة تركيز الأمونيا في سائل الكرش مقارنة بالمجموعة القياسية قبل الأكل وبعد 60 ملغ متوسط تركيز الأمونيا قبل الأكل بصرف النظر عن تأثير الإضافات الغذائية المستخدمة إلى 13.32 مليجرام/100 مل سائل كرصر و بعد 3 ساعات من التغذية ارتفع تركيز الأمونيا لسائل الكرش معقوضة إلى 23.07 مليجرام/100 مل من سائل الكرشر ثم انخفضت تركيزاتها معنوية إلى 17.32 مليجرام/100 ملتر بعد الأكل ب 6 ساعات.

8- وقد لوحظ وجود فروق معنوية عند درجة معنوية 5% في تركيز الأمونيا في سائل الكرشر عند أوقات القياس المختلفة قبل الأكل وبعدة 3 ساعات و 6 ساعات كما سجلت العلائق التجريبية ارتفاعاً في درجة تركيز الأمونيا في عينات سائل الكرشر عند جميع الأوقات قبل الأكل وبعدة 3، 6 ساعات بالمقارنة
بمجمعة الكنترول والتي سجلت أقل قيمة لدرجة تركيز الأمونيا وفي جميع اوقات القياس المختلفة – وقد أدت إضافة البنزونات سوء بعدها أو إضافة إلى العلائق المختارة. المحتوية على كل من الخميرة والفلافوميسين إلى تحسن ولكن غير معنوي في درجة تركيز الأمونيا في سائل الكرش

9- أما فيما يخص بدرجة تركيز الاختيام الدهنية الكلية الطيارة في سائل الكرش فقد لوحظ وجود تأثير معنوي لوقت اخذ العينات على درجة تركيز الاختيام الدهنية المقصدة كان قبل الأكمل حيث بلغ تركيزها 8.45 ملي مكافي / 100 ملتر سائل كرش ثم بدأت في الزيادة معتميا حتى وصلت الى 10.26 ملي مكافي بعد الأكمل ب 3 ساعات ثم انخفضت مرة أخرى معتميا الى 8.97 ملي مكافي / 100 ملتر سائل كرش بعد التشغيل 6 ساعات.

10- أظهرت النتائج المتحصل عليها أيضا أن العلائق المختارة والمحتوية على الخميرة الجافة والفلافوميسين و البنزونات سوء بعدها أو إضافة إلى الخميرة والبنزونات ارتفاعا معتميا في محتوى سائل الكرش من الاختيام الدهنية الكلية الطيارة بالمقارنة بخصائص سائل الكرش للعلاقة القياسية – وان تكرر نفس الانجاز السابق النتائج إلى ه، حيث أدت إضافة البنزونات إلى العلائق المحتوية على الخميرة أو الفلافوميسين إلى زيادة مضوية ولكن غير معنوية (5%) في تركيز الاختيام الدهنية الكلية الطيارة في سائل الكرش للعلاقة التجريبية وعموما فقد كان تركيز الاختيام الدهنية الكلية الطيارة أقل ولكن بدون معنوية في سائل الكرش للحيوانات المعزوفة على العلاقة القياسية وفي جميع اوقات القياس مقارنة بالعلائق المضافة إليها المنشطات والبنزونات.

11- أظهرت الدراسة ان لم يكن لاستخدام الخميرة والفلافوميسين سوء بمفردهما في العلائق أو إضافة الي البنزونات بمفردها أو إلى جانب المتنيات ايت تأثير معنوي على تركيز البروتين الكلبي، والدهون الكلية، والتناسبية المعوية.
للكلسترول. درجة تركيز أنزيمات الكبد في سيرم الدم لجميع الحيوانات المختبرة، وعموما فقد كانت التركيزات المفاجئة والمقدرة لهذه القياسات في سيرم الدم في حدود القدرات الطبيعي للنوع.

12- أظهرت الدراسة أيضا وجود فروق معنوية في درجة تركيز الالبوبونين في سيرم الدم وكذا الجلوبولين و كذا نسبة الالبوبونين إلى الجلوبولين كنتيجة لاستخدام المنشطات بنيوعبا والبنوتابينت - وإن كان أعلاها تأثيرا هو الفلافوماسيين بمفرد - حيث سجلت المجموعة الثانية أعلى درجة تركيز للالبوبونين. ولكن بدون معنوية مع باقي العلاجات المختبرة بما فيها مجموعة المقارنة - بينما سجلت المعايير رقم 5 (فلافوماسيين + بنوتابينت) أقل درجة تركيز للالبوبونين معنوي عند درجة معنوية 5%.

13- أظهرت الدراسة أيضا ان على نسبة تركيز الجلوبولين كانت في سيرم الدم للحيوانات المغذة على (الفلافوماسيين +بنوتابينت) ولكن بدون معنوية مع الحيوانات المغذة على العلبة القياسية، بينما لوحظ أن أقل تركيز للجلوبولين معنوي كان في سيرم الدم للحيوانات المغذة على العلبة القياسية المضافة إليها الفلافوماسيين فقط حيث بلغ تركيزه 12.312 جم / لتر.

14- اختلافت أيضا نسبة تركيز الالبوبونين إلى الجلوبولين معنوي (5%) بين المجاميع كتأثير لاستخدام الأيضات الغذائية المختبرة - حيث أظهرت الدراسة أن إضافة الفلافوماسيين بمفرد - قد سجل أعلى نسبة للالبوبونين/الجلوبولين (1.305) وكان أقل نسبة متحصل عليها (0.746) مع المجموعة المغذة على البنوتابينت (الفلافوماسيين (المعاملة الخاسرة)).

15- أظهرت الدراسة أيضا ان لم يكن هناك أي تأثير معنوي للإضافات المستخدمة كمستشارات نمو وظيفية (الخميرة والفلافوماسيين أو البنوتابينت) بمفرد أو إضافة إلى تلك المشاركات على الوزن النهائي للحيوانات المستخدمة ولا على معدلات الزيادة الكلية واليومية بها. وكانت الفروقات بين المعاملات غير معنوية وان
ظهر نفس الاتجاه السابق الإشارات الإيجابية وهو أن إضافة البنتونايت إلى منشطات النمو (الخميره أو الفلافوماسيين) قد حسن ولكن بدون معنوية من معدلات الزيادة اليومية للحيوانات التجريبية، وعموما فقد سجلت حيوانات مجموعه الكتنورول أقل قيم وزنيه حية أو زيادة في الوزن الكلي أو اليومي المكتسب.

16- ظهر تأثير معنوي للإضافات المستخدمة على متوسط معدل الماكول اليومي للمجتمع، وقد سجلت مجموعة الكتنورول أعلى معدل غذائي يومي سواء في صورة مادة جافة أو مركبات مهجومة أو معدل نشاط مقارنة بالمجمع.

المدعمة غذائيًا بالبنتونايت ومنشطات النمو، وبلغ معدل الماكول اليومي 1600 جم مادة جافة/رس/يوم، 0.962 جم مركبات مهجومة كلية / رس/ يوم، 0.756 جم/معادل نشا / رس/ يوم، وعلى النقيض من ذلك فقد سجلت الحيوانات المغذة على الالعاق التجريبية زيادة غير معنوية في معدل الاستهلاك اليومي من البروتينات والمهموض ولكن بدون معنوية مع حيوانات المجموعة المقارنة.

كانت الأكثر الحيوانات معنوي في استهلاكها من البروتينات الحام المهموض هو مجموعة الخميره (الجافة 198 جم بروتين مهموض يومي) ، وقد أدت إضافة البنتونايت للعلاقة القياسية إلى ارتفاع معدل المستهلك من البروتينات المهموض إلى ( 200 جم يومي) وزاد معدل الاستهلاك اليومي من البروتينات المهموض بالإضافة إلى البنتونايت إلى مجموعه الخميره حتى وصل إلى 203 جم/بروتين خام مهموض يومي.

17- أظهرت الدراسة وجود تأثير معنوي للإضافات المستخدمة لكل من خميره، الفلافوماسيين أو البنتونايت بمفردها أو إلى جانب تلك المنشطات على كفاءة التحويل الغذائي للحيوانات وكان النجاح في قيم التحويل الغذائي أفضًا بإضافة البنتونايت إلى كل من العلاقات المختبرة على خميره جافة أو فلافلوماسيين وبصورة معنوية - وعموما فقد كانت العلاق مختبرة على إضافات هي أفضل معنويًا (5%) في كفاءة تحويلها الغذائي مقارنة بالحيوانات المغذة على العلائق القياسية.
والتي سجلت أقل قيم تحويل غذائي على الإطلاق حيث بلغت 11.94 كجم مادة جافة مأكولة / كجم زيادة في الوزن 7.179 كجم مركبات مضمنة ككلي، 5.642 كجم معدل نشا لكل كجم زيادة في الوزن، وكانت باقي المجموع على الإطلاق في قدرتها على التحويل الغذائي هي مجموعة البنوتايت المضف بمفردة إلى العلاقة القياسية والتي سجلت 10.118 كجم مادة جافة مأكولة 6.412 كجم مركبات مضمنة ككلي مأكولة 5.056 كجم معدل نشا مأكولة / كجم زيادة في الوزن

18 - لم يكن هناك فروق معنوية بين المجاميع عند درجة معنوية 5% في كفاءة التحويل الغذائي للبروتين الخام المضاف لمفرده ونسبة زيادة وزنيه وكان أقل المجاميع في كفاءة التحويل الغذائي للبروتين على الإطلاق ودون معنوية هي مجموعة المقارنة بينما كان أعلاها الحيوانات المغذاة على الفلافوماسين + البنوتايت.

19 - أظهرت الدراسة أيضاً ارتفاع أسعار العلائق المختبرة المضف إليها خمائر جافة، فلافوماسين أو البنوتايت بمفرده أو إلى جانب تلك الاضادات بأنها كانت الأقل على الإطلاق مقارنة بالمجموعة القياسية في تكاليف التغذية للراس للحصول على زيادة وزنيه مدفوعة واحد كجم وان سجلت المجموعة المغذاة على البنوتايت بمفرده أقل تكلفة غذائية و هي 11.463 جنيه / كجم زيادة في الوزن بينما كانت الأعلى في تكاليف الحصول على المنتج (واحد كجم زيادة وزنيه) هي مجموعة المقارنة والتي تكلف الحصول على كجم زيادة وزنيه فيها 13.05 جنيه. وناء على تكاليف التغذية للحصول على واحد كجم زيادة وزنيه فقد كان صافي الربح لكل كيلو جرام زيادة وزنيه في اتجاه معاكس تماماً للتكاليف الغذائية حيث سجلت المجاميع الأقل تكلفة (المجموعة الثالثة) أعلى مبيعية حيث كانت 4.53 جنيه بينما سجلت الحيوانات المغذاة على العلاقة القياسية أقل ربحية 2.95 جنيه / كجم زيادة في الوزن. وعما فان المجاميع المغذاة على علائق مدعمة
بالبيتونايت والمنشطات قد سجلت اعلى ربحية مقارنة بمجموعة الکنترول ، حيث بلغت تلك الزيادة النسبية 41%، 51%، 32%، 44% زيادة على مجموعة الکنترول.

20- أظهرت النتائج المتصل عليها أيضاً مايلي فيما يخص تأثير الإضافات المستخدمة على
خصائص الناباح والتي تم قياسها:

1- لم يكن للإضافات المستخدمة أي تأثير معنوي على وزن الجسم الحي عند نهاية التجربة ولا على وزن الجسم الفارغ (الحي مطروحا منه الجهاز اليدمي ممثلى) ولا على وزن الذبيحة بدون تبريد وان كان هناك فروق معنوية بين الحيوانات المذبوحة في نسبة التضفيف. وكان أفضلها في نسبة التضفيف هي مجموعة البیتونايت + الخمرة ، ولكن بدون وجود فروق معنوية بينها وبين باقي المجاميع المدعمة غذائيًا ولا بين هذه المجاميع وبين الکنترول، كما كانت أقل نسبة تصالف هي مجموعة الحيوانات بالمعاملة الخامسة المغذاً على بیتونايت الفلافومايسين والتي سجلت أقل نسبة تصالف معنوية 47.967% - وقد كان من الملاحظ أن مجموعتي الفلافومايسين سواء بمفرد و/أو بالإضافة إلى البیتونايت هي أقل المجاميع في نسبة تصالفها عموماً مقارنة بباقي المجاميع بما فيها مجموعة الکنترول.

2- لم تؤثر الإضافات المستخدمة للعنلاق على وزن الأجزاء الحشوية الماكولة معنويًا ولا على نسبة الكلية الى وزن الذبيحة حيث بلغت نسبة 5% في المتوسط بصرف النظر عن نوع الاليقة المختارة أو الوزن الحي الصائم للحيوانات المذبوحة.

3- لم تتأثر أيضاً القطعيات الأمامية للذبائح ولا الخلفية لها معنوية بالإضافة المستخدمة في العلاق ولم يكن هناك فروق بين الحيوانات المذبوحة معنويًا (5% ) في أوزان الأجزاء الأمامية والأجزاء الخلفية. وان لوحظ ان نسبة الأجزاء الخلفية تمثل تقريباً 75-80% من الوزن الكلي للأجزاء الأمامية للذبائح.
4- ظهرت فروق معنوية لتأثير الإضافات المستخدمة للعزلان على تركيبها الكيميائي في لحوم الحيوانات المختلفة المذبوحة والتي يصعب تفسيرها علمياً وذلك في النسب المئوية للرطوبة والبروتينى الخام والرماد وإن لم تكن تلك تأثيرات معنوية لهذه الإضافات على المستخلص الأثري للدهن وقد اظهرت النتائج المتحصل عليها ارتفاع نسبة الرطوبة معنوناً في ذبائح مجموعة الكترونول حيث بلغت 60.65% وكانت أعلى أيضاً في نسب كل من البروتينى الخام 18.57% كما احتوت ذبائحها على أقل نسبة رماد معنوناً 1.1%.

5- اظهرت النتائج الخاصة بالتركيب الكيميائي لللحوم الحيوانات المذبوحة بصرف النظر عن المعاملات الغذائية وصفات الذبابة ودرجة معنونية في الصفات من عدمه، ان الحيوانات بمتوسط أوزان 60 كجم تحتوي لحومها في المتوسط على 60% رطوبة، 19% بروتينى خام، 20% دهن خام و1% رماد عند عمر السنة.

الاستنتاج العام والتوصيات

على ضوء النتائج المتحصل عليها يمكن استنتاج أن إضافة كل من الخبيرة الجافة، الفلوفاميسين، والبينوتايت إلى العزلان المرتبطة باليوم قد أدى إلى:

1- ارتفاع القيمة الهضمية لعناصر الغذاء (العنبر المركز) وارتفاع القيمه الغذائية له بصورة غير معنونية وكان التحسن ملحوظاً عند إضافة البنوتايت إلى جانب كل من الخبيرة والفلوفاميسين.

2- كان لإضافة الخبيرة الجافة والبنوتايت بالذات تأثيراً إيجابياً وملحوظاً على صفات سائل الکرث من حيث كمية الأمونيا والحماض الدهنية الكلية الطيارة المنتجة وكذا كفاءة النمو والتحول الغذائي للحيوانات المغذة على تلك العزلان حيث أدى استخدام كل من الخبيرة والبنوتايت إلى ارتفاع القيمة الهضمية للبروتينى العليقة وكيتها البروتينى - كما قللت من حجم الماكولات اليومي وحسبت
من كفاءة التحويل الغذائي للحيوانتان مما انعكس على زيادة الربحية المتحصل
عليها من الحيوانات المغذاة على الزيتة الفيبرة المدعمة بهذه الأضافات.
3- لم تتأثر خصائص الدم كثيرا في القياسات التي تم رصدها بنوع المنشطات
المستخدمة والبنوانت وذات تأثير غير معنوي على أنواع مختلفة من الحيوانات
الخاصة بالنوع - وكما يلاحظ الحفظ وعلميا تأثيرات ضارة أو سلبية للإضافات
المستخدمة على أداء الحيوانات وحيويتها وانتاجتها.
4- رغم وجود بعض الاختلافات المعنوية في بعض القياسات التي تم دراستها على
الذباح والتركيب الكيميائي لحم تلك الحيوانات فإنه يصعب تفسيرها علميا ولم
يمكن لتلك الإضافات ضمنها تأثير معنوي ملموس على صفات الذباح ولا
تركيبها الكيميائي.
5- كنظرة عامة وبناء على التقييم العلمي للنتائج المتحصل عليها إجمالا و
للإضافات التي جرى تقييمها واحتمالاً انتابها غذائية - فإنها يمكن القول وتبثة بـ
الفلاموسين من تلك المركبات حيث لم تؤدي اضافة للإضافات التي تم
للموسة قياسا لكل من الحيوانات والبنوانت بالذات وكانت النتائج المتحصل
عليها من إضافة الفلاموسين (إذا ما استباعنا تأثيرها على تحسين معاملات
الهضم للإضافات المختبرة ورفع القيمة الغذائية لها) كانت تتأثر في بآلات القياسات
غير واضحة المعالم وغير محددة ومتمضرة أحيانا
النصوصية:
وبناء عليه فإننا نوصي باستعمال الخميره الجافة والبنوانت كإضافات غذائية
للإضافات التي تثبت علمياً تأثيرها الإيجابي على كل القياسات التي تم
قياسها على الحيوانات التجريبية في النصوص بتجربة نسب مختلفة منها وصولا
للنسبة المثلى إيجابياً وقدما النصوص بتجربة استخدام خيارات أكثر فرقاً في قيمتها
الغذائية للوصول إلى أكف. استعمال اقتصاد لهذه الإضافات في تغذية الحيوانات
المزرعة.
استخدام منشطات النمو و الببتونايت
في علاقات الأغذام

 رسالة مقدمة من

أكرمى حامد صادق حسن
الإجازة العالمية (كالوريوس) في العلوم الزراعية (نتاج حيواني) كلية الزراعة- جامعة الأزهر 1995م
درجة التخصص (الماجستير) في العلوم الزراعية (نتاج حيواني)- كلية الزراعة- جامعة الأزهر 2002 م

استيفاء لستطيعات الحصول على درجة العامية (دكتوراه الفلسفة)
في العلوم الزراعية (نتج حيواني- تغذية حيوان)

قسم الإنتاج الحيواني
كلية الزراعة- جامعة الأزهر
1430 هـ
2009 م
استخدام منشطات النمو والبنتونايت في علاج الأغقم

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استيفاء لشروط الحصول على درجة الدكتوراه في العلوم الزراعية (تغذية حيوانات)

قسم الإنتاج الحيواني
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استيفاء لمتطلبات الحصول على درجة
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في العلوم الزراعية (إنتاج حيواني - تغذية حيوان)

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