J. Agric. Sci. Mansoura Univ., 27 (2): 855 - 867, 2002

# THE RESPONSE OF MUSCOVY DUCKS TO VARYING LEVELS OF DIETARY ENERGY AND YEAST CULTURE

**Samy, M.S.M.; S.A. Yassein and G.M. El-Mallah**
**Department of Animal and Poultry Nutrition and Production , National research Center, Dokki, Egypt**

## ABSTRACT

This work was designed to study the response of Muscovy ducks to different levels of dietary energy and yeast culture (YC) on performance, carcass yield, carcass composition and economical efficiency.

One hundred and fifty one-day old Muscovy ducklings were wing banded and were divided into five treatment groups in three replicates of 10 each fed on (2930 & 2730 Kcal ME/Kg) and (3030 & 2475 K cal ME/Kg) energy diets during starting and growing periods, respectively. YC was added with either high or low energy level. The calorie: protein ratio was kept constant within each energy level, and each experimental diet was fed to one of the five treatment groups from one day to 12 weeks old.

Live body weight (LBW) and weight gain (WG) of ducks were improved significantly by feeding high energy diets during starter and grower periods and declined by feeding low energy grower (LEG) diet. However, feed intake (FI) increased by feeding LEG-diet, while feed conversion (FC) was better by feeding high energy grower (HEG) diet. Dressed weight, edible parts and abdominal fat pad percentages of birds increased when offered HEG-diet, while YC added levels showed better values of most growth performance traits by feeding LEG-diet than when HEG-diet was fed and had no adverse effect on carcass yield. However, carcass moisture and protein percent decreased while carcass fat content increased by feeding high energy diets. Economical efficiency (EE) was better for ducks fed HES-LEG-diets which recommended to be used than the other dietary groups.

## INTRODUCTION

Poultry production in Egypt has become one of the biggest agriculture industry and its improvement is one of the main objectives of both private and public sectors. Therefore, several investigators have pointed out the possibility to reach an economic productivity with a good meat quality for local market demands.

In this occasion, ducks raising has considerable potential as a mean of increasing meat production. Attempts have been made to minimize feeding cost by using different levels of dietary energy. Bioavailable energy studies have shown differences in the dietary energy requirements and utilization of ducks (Siregar and Farrell, 1980 and Ostrowski-Meissner, 1983).

Most of the applied researches came to the conclusion that dietary energy level appears to have no effect on live weight gain and an increase in dietary energy level had no effect on growth rate and carcass yields (Kassim and Suwanpradit, 1996; Leeson *et al.*, 1996; Golian and Mirzadeh, 1999 and Furlan *et al.*, 1999). However, available literatures cover some knowledge on these traits, but a problem associated with the processing of ducks to parts is abdominal fat which has to be diposed off by the slaughtering plant for a relatively lower cost. In this respect, providing diets with high energy level, could result in extra deposition of fat which is not appreciated by the consumer (Deaton *et al.*, 1983; Holsheimer and Veerkamp, 1992; Rajini *et al.*, 1998 and Zanusso *et al.*, 1999). Conversely, other trials for reduction of carcass fat for broilers were performed by feeding low-energy diets (Pfaff and Austric, 1976; Robbins, 1981 and Salmon et al., 1983). Therefore, recently, lower-energy containing diets have been tried in an attempt to resolve such problems (Leeson *et al.*, 1995) and it is realized that overall growth rate is little affected.

On the other hand, the use of yeast culture (YC) in poultry diets as dietary biological additive, has resulted in much attention being directed towards the improvement of performance (Savage *et al.*, 1985). A lack of effect was observed on live weight and feed efficiency of market turkeys fed diets supplemented with yeast culture (Brewer, 1983). Moreover, Brake (1991) found that the inclusion of yeast culture in the broiler breeder diets had no effect on its performance. Whereas, YC added in Pekin ducklings, increased feed consumption, and improved body weight, weight gain and feed conversion (Osman *et al.*, 1996).

The use of yeast culture have not been reported in poultry diets and there is a lack of information about the performance of ducks and their energy requirements which could help in enhancing their utilization in commercial poultry production . Therefore, the present study aimed to study the response of ducks to different levels of energy supplemented with YC in balanced diets designed to meet the nutrient requirement of ducks during starter and finisher periods on growth performance, carcass quality and composition of abdominal fat pad and economical efficiency.

## MATERIALS AND METHODS

The present study was carried out at the poultry farm, Faculty of Agriculture, Cairo University and the Department of Animal and Poultry Nutrition and Production, National Research Center from July to September, 1998. This work was designed (Table 1) to study the response of ducks to different levels of dietary energy and yeast culture supplementation on performance , carcass yield and composition . One hundred and fifty one-day old Muscovy duckings purchased from a commercial hatchery were wing banded and were distributed into five experimental groups in three replicates of 10 each, with similar initial body weight.

**Table (1): The experimental design :**

| Treatment | Energy level (Kcal ME/Kg) | |
|---|---|---|
| | Starter period (0-2 wks) | Grower period (3-12 wks) |
| $T_1$, control | 2932 (HES) | 3033 (HEG) |
| $T_2$, HES-LEG diet | 2932 (HES) | 2475 (LEG) |
| $T_3$, LES-HEG diet | 2733 (LES) | 3033(HEG) |
| $T_4$, HES-LEG diet | 2932 (HES) + (0.5% YC) | 2475 (LEG) + (0.25% YC) |
| $T_5$, LES-HEG diet | 3732 (LES) + (0.5% YC) | 3035 (HEG) + (0.25% YC) |

Two dietary energy levels being high and low were 2930 and 2730 Kcal ME/Kg during the starter period (from 0 to 2 weeks old) and 3030 and 2475 K cal ME/Kg during grower period (from 3 to 12 weeks old). Each group of ducks were assigned for one of four experimental diets. The first group was fed high energy diet (HE) during starter and grower period, as control ($T_1$) , group 2, was fed high energy diet (HES) during starter and low energy diet (LEG) during grower ($T_2$), group 3, was fed LES during starter and HEG during grower period ($T_3$), however, the groups 4,5 were fed on $T_2$ and $T_3$, respectively , with the addition of yeast culture (YC) at 0.5% and 0.25% in both starter and grower diets, respectively. The calorie: protein ratio was kept constant within each energy level all the diets during the starter and grower periods. The composition and formulation of the experimental diets as recommended by NRC (1994) are shown in Tables (2&3). The chemical analysis of the experimental diets was carried out according to A.O.A.C. (1990).

**Table (2): Composition and chemical analysis of the experimental starter diets**

| Ingredients / Treatment | HE | LE | HE + YC | LE + YC |
|---|---|---|---|---|
| Yellow corn | 63.90 | 54.40 | 63.90 | 53.90 |
| Soybean meal (44%) | 25.00 | 24.50 | 24.50 | 24.50 |
| Broiler concentrate | 10.00 | 10.00 | 10.00 | 10.00 |
| Wheat bran | - | 10.00 | - | 10.00 |
| Yeast* | - | - | 0.50 | 0.50 |
| Limestone (ground) | 0.30 | 0.30 | 0.30 | 0.30 |
| Vit.Min. mix[2]. | 0.30 | 0.30 | 0.30 | 0.30 |
| Sodium chloride | 0.30 | 0..30 | 0.30 | 0.30 |
| Lysine, HCl | 0.05 | 0.05 | 0.05 | 0.05 |
| DL-methionine | 0.15 | 0.15 | 0.15 | 0.15 |
| Total | 100 | 100 | 100 | 100 |
| **Calculated values[3]:** | | | | |
| Crude protein % | 21.63 | 22.17 | 21.50 | 22.19 |
| ME Kcal/Kg | 2932 | 2733 | 2937 | 2732 |
| C/P ratio | 135 | 123 | 136 | 123 |
| Lysine % | 1.22 | 1.24 | 1.20 | 1.24 |
| Methionine % | 0.57 | 0.57 | 0.57 | 0.57 |
| Calcium % | 0.90 | 0.91 | 0.90 | 0.91 |
| Available phosphorus % | 0.42 | 0.43 | 0.42 | 0.43 |
| **Chemical composition[4]** | | | | |
| Dry matter % | 90.26 | 89.65 | 90.02 | 89.53 |
| Crude protein % | 22.82 | 22.11 | 22.38 | 22.48 |
| Ether extract % | 1.67 | 1.27 | 2.59 | 2.43 |
| Crude fiber % | 3.50 | 4.69 | 3.60 | 4.73 |
| Ash % | 7.37 | 6.77 | 6.92 | 5.54 |
| Nitrogen free extract % | 54.90 | 54.81 | 54.53 | 54.35 |

1- Broiler concentrate contain : ME (K cal/Kg) 2342, crude protein 52%,crude fiber 3%, calcium 7%, phosphorus available 3%, lysine 3.27% and methionine 1.48%.

2- Supplied per Kg diet: Vit A, 12000 IU; Vit $D_3$, 2200 IU; Vit E, 10 mg; Vit K3, 2mg; vit $B_1$, 1mg; Vit $B_2$, 4mg: Vit $B_6$, 1.5mg; Vit $B_{12}$, 10 μg; Niacin, 20mg; Pantoghenic acid, 10mg; folic acid, 1mg; Biotin, 50 μ; choline chloride, 6500 mg; copper, 10 mg; Iodine, 1mg; Manganese, 55mg; Zinc, 50mg; Selenium, 0.11m and iron, 30 mg.

3- Calculated according to NRC (1994).

4- Determined according to the methods of A.O.A.C. (1990).

* Diamond V "XP" Yeast Culture: is a dried product composed of saccharomyces cerevisiae, yeast and contains about 12%CP, 2.8% EE, 6.2% CF and 3% ash , and grown on a media of ground yellow corn. It improves the growth performance. Diamond V Mills, Inc., Ceder Rapids, IA, U.S.A.

**Table (3):Composition and chemical analysis of the experimental grower diets.**

| Treatment / Ingredients | HE | LE | HE + YC | LE + YC |
|---|---|---|---|---|
| Yellow corn | 72.90 | 47.90 | 72.90 | 47.90 |
| Soybean meal (44%) | 16.00 | 11.00 | 15.75 | 10.75 |
| Broiler concentrate | 10.00 | 10.00 | 10.00 | 10.00 |
| Wheat bran | - | 30.00 | - | 30.00 |
| Yeast* | - | - | 0.25 | 0.25 |
| Limestone (ground) | 0.30 | 0.30 | 0.30 | 0.30 |
| Vit.Min. mix[2]. | 0.30 | 0.30 | 0.30 | 0.30 |
| Sodium chloride | 0.30 | 0.30 | 0.30 | 0.30 |
| Lysine, HCl | 0.05 | 0.05 | 0.05 | 0.05 |
| DL-methionine | 0.15 | 0.15 | 0.15 | 0.15 |
| Total | 100 | 100 | 100 | 100 |
| **Calculated values[3]:** | | | | |
| Crude protein % | 18.44 | 18.82 | 18.36 | 18.74 |
| ME.Kcal/Kg | 3033 | 2474 | 3035 | 2476 |
| C/P ratio | 164 | 131 | 165 | 132 |
| Lysine % | 1.00 | 0.98 | 0.99 | 0.98 |
| Methionine % | 0.53 | 0.52 | 0.53 | 0.52 |
| Calcium % | 0.88 | 0.90 | 0.88 | 0.90 |
| Available phosphorus % | 0.40 | 0.42 | 0.40 | 0.43 |
| **Chemical composition[4]** | | | | |
| Dry matter % | 90.6 | 90.41 | 88.12 | 88.42 |
| Crude protein % | 18.67 | 18.40 | 18.35 | 18.25 |
| Ether extract % | 2.68 | 2.09 | 2.00 | 2.79 |
| Crude fiber % | 3.80 | 6.00 | 3.43 | 5.83 |
| Ash % | 5.98 | 5.63 | 5.20 | 5.98 |
| Nitrogen free extract % | 59.47 | 58.29 | 59.14 | 55.57 |

All ducklings were floor brooded in electrically heated rooms until two weeks old then reared under conventional managerial hygienic and environmental conditions. Feed and water were offered ad-Libitum. Live body weight (LBW) and feed intake (FI) were recorded at bi-weekly intervals until marketing age. The traits studied were weight gain (WG) and feed conversion ratio (FC), besides to the growth rate (GR).

At 12 weeks of age, sex ducks from each group were randomly chosen (3 males and 3 females), and deprived from feed for 12 hours, then weighed and slaughtered to complete bleeding and weighed . Giblets (gizzard, liver & heart), carcass and abdominal fat pad weights were recorded . Chemical analysis of the carcass meat was determined also by A.O.A.C. (1990). Economical efficiency was also estimated.

Data obtained were statistically analyzed using analysis of variance which was carried out according to Snedecor and Cochran (1982). The significant differences between treatment means was examined using Duncan's Multiple Range Test (Duncan, 1955).

## RESULTS AND DISCUSSION

Results in Table 4 show that ducks fed high energy diet (HE) during starting and growing periods ($T_1$), improved significantly LBW and WG, but when giving low energy growing (LEG) diet ($T_2$), ducks showed decline in LBW and WG. The total WG during the entire experimental period for birds of $T_3$ (fed LES-diet and HEG-diet) was heavier than the other groups, followed by $T_1$ (control) which fed HES-diet and HEG-diet. This may be attributed to that ducks have an exceptional capacity for compensatory growth during growing-finishing period (Dean, 1972), therefore, the groups of $T_2$ and $T_4$ which fed LEG-diet compensated the loss in weight and reached nearly the same BW and WG of groups fed the high energy diet. Results agreed with the findings of Mabray and Waldroup (1981), Wiseman (1988) and Shehata (1995) who reported that the high energy diet improved significantly growth performance in ducklings. Similar results were obtained by Holsheimer and Veerkamp (1992); Kassim and Suwanpradit (1996); Leeson *et al.*, (1996); Ibrahim *et al.*, (1997) and Golian and Mirzadeh (1999).

However, YC supplementation in both high and low energy diet induced adverse effect on body performance ($T_4$ and $T_5$). So, YC did not affect the compensatory growth for $T_4$ (LEG-diet), but declined for $T_5$ (HEG-diet). Brewer (1983) found a lack of effect on BW of market turkeys fed diets supplemented with YC. The inclusion of YC in the diet of broiler breeders had no effect on the performance of the birds (Brake, 1991).

Regarding feed intake (FI), the group fed low energy diet during starting and growing periods ($T_2$) consumed more feed than those fed the high energy diet ($T_1$), which may be due to the high ability for ducks to increase FI and adapt to maintain a near normal WG even when fed low energy diet (Dean, 1978). Also, YC supplementation increased FI with either higher or lower energy diet (Savage *et al.*, 1984). This might enhanced feed palatability associated with YC (Peppler, 1982) . The total FI was differed significantly among treatments, while $T_2$ (fed HES-LEG diet) showed a higher total FI. Similar results were obtained by Ali (1990), Nahashon *et al.* (1995) and Kassim and Suwanpradit (1996). Accordingly, feed conversion ratios (FC) followed the same trend described to FI. The best FC was recorded in $T_3$ (LES-diet and HEG-diet) and was similar to $T_1$ (control), whereas, $T_4$, $T_2$ and $T_5$ showed increasing in FC especially those received YC. This improvement is mainly due to increasing BWG and reduction in FI. Golian and Mirzadeh (1999) and Zanusso et al., (1999) showed that FC ratios were linearly improved with the increase in dietary energy . Similar results were reported by Tidwell *et al.* (1988), Holsheimer and Veerkamp (1992) and Ibrahim *et al.*, (1997). However, a relatively improved efficiency was observed due to feeding YC to turkey breeder hens (Savage and Mirosh, 1990), while ,Krause *et al.* (1989) and Bradley *et al.* (1994) declared that YC may enhance enzymatic activity in the digestive tract resulting in improving nutrient utilization. Also, YC may increase the biological value of nitrogenous compounds absorbed along the digestive tract (Glade and Fist, 1988 and Crumplen *et al.*, 1989).

Table (4): Performance of ducks fed different levels of dietary energy and YC (X ± SE).

| Item | Excremental Treatments | | | | |
|---|---|---|---|---|---|
| | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ |
| **Live body weight (g)** | | | | | |
| Initial | 50.56±0.63 | 50.83±0.19 | 49.89±0.49 | 50.00±0.48 | 50.67±0.96 |
| 2 - wks | 349.02±6.47 ab | 348.61±11.32 ab | 364.44±4.85 a | 366.11±7.95a | 326.39±6.98 b |
| 12 - wks | 3485.56±72.73 | 3376.67±33.13 | 3491.67±127.72 | 3327.78±40.97 | 3255.55±48.73 |
| **Body weight gain (g/bird)** | | | | | |
| 0 - 2 wks | 298.46±6.94 ab | 297.78±11.23 ab | 314.55±4.36 a | 316.11±8.29 a | 275.17±7.18 b |
| 3 - 12 wks | 3136.54±51.88 | 3028.04±21.98 | 3127.22±25.02 | 2961.67±38.38 | 2929.16±49.70 |
| 0 - 12 wks | 3435.0±73.25 | 3325.83±33.07 | 3441.78±72.48 | 3277.78±41.42 | 3207.22±48.78 |
| **Feed intake (g/bird)** | | | | | |
| 0 - 2 wks | 475.02±10.64 bc | 475.02±3.34 bc | 500.08±5.04 ab | 463.12±14.14 c | 525.0±9.24 a |
| 3 -12 wks | 10332.0±203.7 b | 11706.8±11.9 a | 10397.1±56.0 b | 10189.2±76.3 b | 11578.0±300 a |
| 0 -12 wks | 10806.6±133.2 b | 12181.68±3.24a | 10896.5±52.92b | 10652.0±65.5 b | 12102.7±308 a |
| **Feed conversion (g feed/g gain)** | | | | | |
| 0 - 2 wks | 1.59±0.06 b | 1.60±0.04 b | 1.59±0.04 b | 1.47±0.05 b | 1.91±0.02 a |
| 3 -12 wks | 3.30±0.14 b | 3.87±0.03 a | 3.34±0.13 b | 3.44±0.02 b | 3.95±0.05 a |
| 0 -12 wks | 3.15±0.12 b | 3.66±0.04 a | 3.17±0.12 b | 3.25±0.02 b | 3.77±0.08 a |
| **Relative growth rate** | | | | | |
| 0 - 2 wks | 149.4±1.25 | 149.0±1.36 | 151.8±0.15 | 151.9±1.26 | 146.2±0.74 |
| 3 - 12 wks | 163.6±0.83 | 162.6±0.77 | 162.1±1.06 | 160.4±0.72 | 163.54±0.89 |
| 0 – 12 wk | 194.3±0.18 | 194.0±0.05 | 194.4±0.19 | 194.1±0.12 | 193.9±0.12 |

a,b,c, : Means in the same row with different superscripts are significantly different (P<0.05).

Regarding the growth rate (GR), the group of $T_3$ had better GR than the others which were approximately similar. This improvement may be related to higher BW and better FC. In this respect, Leeson *et al.* (1996) and Marinov *et al.* (1997) showed that a great increase in GR was associated by high energy level.

**Carcass characteristics:**

The data for carcass yield are shown in Table (5). There was a marked differences in duck carcass weight due to dietary energy levels. The highest carcass weight was obtained with the high energy diet during growing period ($T_1$, $T_3$ and $T_5$) with no significant differences. This confirms the observations of Mabray and Waldroup (1981), Summers *et al.* (1988), Holsheimer and Ruesink (1993), Leeson *et al.* (1996) and Zanusso *et al.* (1999). Furthermore, edible parts percentage was improved by feeding high energy diets (El-Naggar *et al.*, 1997). However, percentages of carcass and giblets were not affected by YC supplementation ($T_4$ and $T_5$). Similar results were reported by Osman *et al.* (1996). On the other hand, a positive relationship between abdominal fat percentage and energy level in the growing diets was observed. The least amount of fat deposition was obtained with the diet containing low energy diet ($T_2$ and $T_5$) . This decrease was also reflected in abdominal fat pad weight as percent to live weight. Similar results were reported by Jackson et al. (1982) , Deaton and Lott (1985), Holshiemer and Veerkamp (1992); Kassim and Suwanpradit (1996); El-Naggar *et al.* (1997) and Zanusso *et al.* (1999) who stated that abdominal fat content increased with increasing energy level. However, YC supplementation had no adverse effect on carcass traits of ducks (Osman *et al.*, 1996).

## Carcass composition :

Regarding the influence of dietary energy on carcass composition (Table 5), the results showed a significant decrease in percent of moisture content occurred in response of increasing dietary energy. Moreover, there was an inverse relationship between dietary energy level and carcass protein content which decreased by increasing dietary energy level. However, increasing dietary energy showed significantly progressive increase in percent of carcass fat content. These results agreed with those of Seaton *et al.* (1978), Jackson *et al.* (1982); Kassim and Suwanpradit (1996) and El-Naggar *et al.* (1997) who reported that significant decrease in percent of carcass moisture and protein contents, and significant increase in carcass fat content was associated with increasing dietary energy level. However, no significant effect due to dietary energy level was detected on percent ash content in carcass, which was higher for groups fed low energy diet than those fed high energy diet.

**Table (5): Some carcass traits and carcass composition of ducks fed different levels of dietary energy and YC .**

| Traits | | Experimental treatments | | | | |
|---|---|---|---|---|---|---|
| | | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ |
| Live body weight | (g) | 3485 | 3208 | 3850 | 3377 | 3477 |
| Carcass weight | (g) | 2233 | 2055 | 2543 | 2214 | 2300 |
| Dressing | % | 64.13±1.80 | 64.04±1.43 | 66.06±0.44 | 65.56±1.27 | 66.16±0.33 |
| Giblet weight | (g) | 243 | 232 | 208 | 146 | 188 |
| | % | 6.97±0.51 a | 7.21±0.38 a | 5.38±0.23 b | 4.32±0.31 b | 5.39±0.27 b |
| Edible parts | (g) | 2818 | 2637 | 3124 | 2674 | 2827 |
| | % | 80.77±1.37 | 82.19±095 | 81.14±0.53 | 79.16±1.76 | 81.30±0.57 |
| Inedible parts | (g) | 493 | 540 | 492 | 516 | 506 |
| | % | 14.15±1.34 ab | 16.80±0.82 a | 12.75±0.31 b | 15.28±1.40 ab | 14.52±0.38 ab |
| Abdominal fat | (g) | 50.16 | 51.14 | 72.81 | 41.05 | 58.50 |
| | % | 1.44±0.16 b | 1.56±0.16 b | 1.85±0.45 a | 1.22±0.44 c | 1.68±0.26 a |
| Visceral fat | (g) | 72.10 | 48.23 | 122.17 | 28.50 | 64.09 |
| | % | 2.07±0.42 ab | 1.48±0.26 b | 3.16±0.91 a | 0.83±0.17 c | 1.84±0.44 b |
| **Carcass composition % (on DM basis)** | | | | | | |
| Moisture | | 73.23±0.16 b | 73.57±0.18 b | 74.23±0.16 a | 74.45±0.68 a | 74.62±0.57 a |
| Protein | | 24.25±0.12 ab | 24.99±0.31 ab | 23.64±0.37 b | 25.40±0.47 a | 24.39±0.64 ab |
| Ether extract | | 1.31±0.01 b | 1.28±0.02 b | 1.39±0.16 b | 1.01±0.09 c | 1.78±0.06 a |
| Ash | | 1.34±0.01 | 1.33±0.01 | 1.21±0.25 | 1.34±0.02 | 1.26±0.04 |

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

**Economical efficiency :**

Data in Table (6) show that the total fed cost was calculated on basis of Kg of feed intake of starter and grower diets multiplied by the costs of the respective diets. Also, the price of feed/Kg increased by using yeast culture additive (YC). Moreover, the total cost of feed and net revenue were influenced by adding YC level. However, the group of $T_3$ offered low energy starter diet (0-2 wks) and high energy grower diet (3-12 wks) recorded the best economical efficiency (EE) compared to those of other groups and was nearly similar to the control . Likewise, feeding low energy grower diet with 0.25% YC ($T_4$) improved EE compared to those fed on high energy grower diet ($T_5$).

Generally, it could be concluded that , feeding HES-LEG-diets ($T_3$) for ducks recommended to be used, and had no adverse effect on growth performance, carcass yield and reduced feeding cost during starting and growing periods.

**Table (6): Input-output analysis and economical efficiency of different treatments.**

| Items | Treatments | | | | |
|---|---|---|---|---|---|
| | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ |
| **Price of feed (PT/Kg)**[1] | | | | | |
| Starter | 81 | 81 | 80 | 86 | 85 |
| Grower | 78.3 | 73.8 | 78.3 | 76.1 | 80.6 |
| **Feed intake/bird (Kg)** | | | | | |
| Starter | 0.475 | 0.475 | 0.500 | 0.463 | 0.525 |
| Grower | 10.332 | 11.707 | 10.397 | 10.189 | 11.578 |
| **Feed cost/bird (L.E)** | | | | | |
| Starter | 0.38 | 0.38 | 0.40 | 0.40 | 0.45 |
| Grower | 8.09 | 8.64 | 8.14 | 7.75 | 9.33 |
| Total feed cost/bird (L.E) | 8.47 | 9.02 | 8.54 | 8.15 | 9.78 |
| Final body weight (Kg) | 3.486 | 3.377 | 3.492 | 3.328 | 3.256 |
| Fixed cost//bird (L.E) | 4.25 | 4.25 | 4.25 | 4.25 | 4.25 |
| Price of kg live weight (L.E)[2] | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| Total revenue/bird (L.E) | 27.89 | 27.02 | 27.94 | 26.62 | 26.05 |
| Total cost/bird (L.E) | 12.72 | 13.27 | 12.79 | 12.40 | 14.03 |
| Net revenue/bird (L.E) | 15.17 | 13.75 | 15.15 | 13.86 | 12.02 |
| Economical efficiency (L.E) | 1.193 | 1.036 | 1.185 | 1.120 | 0.857 |
| Relative E.E | 100 | 87 | 99 | 93 | 72 |

1- According to the local market, June, (1998).
2- According to the price at the experimental time.

- Total revenue/bird = Price of Kg at marketing X LBW.
- Total cost/bird = Total Feed Cost + fixed cost /bird.
- Net revenue/bird = Net revenue/bird - Total cost/bird.
- Economical efficiency = Net revenue/bird/Total cost/bird
- Relative E.E. = As relative to the control

## REFERENCES

Ali, S.A. (1990). Using different levels of energy and protein in broiler rations during winter and summer. M.Sc. Thesis , Fac. of Agric. Zagazig Univ., Egypt.

Association of Official Analytical Chemists A.O.A.C. (1990). Official Methods of Analysis 15th Ed. Association of Official Analytical Chemists Washington, D.C., U.S.A.

Bradley, G.L.; T.F. Savage and K.I. Timm. (1994).The effect of supplementing diets with *saccharomyces cerevisiae* Var. boulardii on male poult. performance and Ileal morphology. Poultry Sci., 73: 1766-1770.

Brake, J. (1991). Lack of effect of a live yeast culture on broiler breeder and progeny performance. Poult. Sci., 70: 1037-1039.

Brewer, C.E. (1983). Live yeast culture as a feed ingredient for market turkeys. Breakthrough 7:3, North Carolina State Agricultural Extension Service, Raleigh, NC, 4pp.

Crumplen, R.; T. D'Amore; C.J. Panchal; I. Russell and G.G. Stewart (1989). Industrial uses of yeast: Present and Future. Yeast ( Special issue) 5: 3-9.

Dean, W.F. (1972).Recent findings in duck nutrition. Proc. Cornell Nutr. Conf. pp.77-85.

Dean, W.F. (1978). Nutrition Requirements of Ducks. Proceeding of the Cornell feed manufactures, 132-140.

Deaton, J.W. and B.D. Lott (1985). Age and dietary energy effect on broiler abdominal fat deposition. Poult Sci., 64: 2161-2164.

Deaton, J.W.; J.L. Mcnaughton and B.D. Lott (1983). The effect of dietary energy level and broiler body weight on abdominal fat. Poult. Sci., 62: 2394-2397

Duncan, D.B. (1955). Multiple Range and Multiple F. Tests. Biometrics, 11: 1-42.

El-Naggar, N.M.; A.Z. Mehrez and F.A.M. Aggoor (1997). Effect of different dietary protein and energy levels during Roaster Period on: 2. carcass composition, yield, physical characteristics of meat and serum constituents. Egypt. Poult. Sci., 17: 107-132.

Furlan, R.L.; M. Macari; E.B. Matheiros; C. Ingraci and H.T. Meireles (1999). Effect of drinking water chlorination and dietary energy level on body weight gain and water intake in broiler chickens. Revista-Brasileira-de-zootecnia, 28(3): 542-547.

Glade, M.J. and M.D. Fist (1988). Dietary yeast culture supplementation enhance urea recycling in the equine large intestine. Nutr. Rep. Int., 37: 11-17.

Golian, A. and G. Mirzadeh (1999). Optimizing the level of energy and protein in diets of broilers raised at high ambient temperature. Iranian Journal of Agricultural Sciences, 30(2):225-231.

Holsheimer, J.P. and E.W. Ruesink (1993). Effect on performance, carcass composition, yield, and financial return of dietary energy and lysine levels in starter and finisher diets fed to Broilers. Poultry Sci., 72: 806-815.

Holsheimer, J.P. and C.H. Veerkamp (1992). Effect of dietary energy , protein ,and lysine content on performance and yields of two strains of male broiler chicks. Poult. Sci., 71: 872-879.

Ibrahim, K.A.; M.M. Osman and E.S. Saleh (1997). Effect of gemfibrozil and citric acid as lipid regulating agents on duck performance. Egypt. Poult. Sci., 17: 77-92.

Jackson, S., J.D. Summers and S. Leeson (1982). Effect of dietary protein and energy on broilers carcass composition and efficiency of nutrient utilization. Poult. Sci., 61: 2224-2231.

Kassim, H. and S. Suwanpradit (1996). The effect of dietary energy levels on the carcass composition of the broilers. Asian-Australasian-Journal-of-Animal Science, 9(3): 331-335.

Krause, O.G.; C.R. Richardson; R.E. Castleberry and C.W. Cobb (1989). Biological responses of chicks fed sorghum grain based diets with added grain specific enzymes mixture and yeast. Texas Tech. Of Agricultural Science, Lubbock, T5, 236: 7-8.

Leeson, S.; L. Caston and J.D. Summers (1996). Broiler response to diet energy . Poult. Sci., 75: 529-535.

Leeson, S.; G. Diaz and J.D. Summers (1995). Ascites. Pages 43-44 in: Poultry Metabolic Disorders and Mycotoxins. University Books, Guelph, ON, Canada.

Mabray, C.J. and P.W. Waldroup (1981). the influence of dietary energy and amino acid levels on abdominal fat pad development of broiler chickens. Poultry Science, 60: 151-159.

Marinov, B.; V. Georgieva and D. Pavlov (1997). Production traits of Arbor Acres hybrid broilers at different levels of energy and protein in fodder mixes. Zhivotnov. "dni-Nauki". Suppl, 131-135.

Nahashon, S.M.; J.R. Bartlett and E.J. Smith (1995). Responses to dietary crude protein and energy levels by crosses of chickens involving white Plymouth Rock. Poult. Sci., 74 (Suppl. 1): 207 (Abst.).

NRC National Research Council (1994). Nutrient Requirement of Poultry. 9$^{th}$ Rev. National academy press. Washington, DC.

Osman Mona; Y.A. Attia and El-Samra Abou Egla (1996). Effect of prozyme and yeast culture supplementations on performance of Pekin ducklings fed diets containing dried beet pulp. Egypt. Poult. Sci., 16(3): 573-599.

Ostrowski-Meissner, H.T. (1983). Effects of contamination of diets with aflatoxins on growing ducks and chickens. Tropic. Anim. Hlth. Prod. 15: 161-168.

Peppler, H.J. (1982). Yeast Extracts. In. A.H. Rose (Editor), Fermented Foods. Academic Press, London, PP.293-312.

Pfaff, F.E. and R.E. Austric (1976). Influence of diet on the development of the abdominal fat pad in the Poultry . J. Nut., 106: 443-450.

Rajini, R.A.; R. Kumararaj; D. Narahari; R. Ravindran and K. Sundaresan. (1998). Influence of season , form of feed, dietary energy , age and sex on carcass traits of broilers. Indian Journal of Poultry Science, 33(3): 346-348.

Robbins, K.R. (1981). Effects of sex, breed, dietary energy level , energy source and calorie: protein ratio on performance of energy utilization by broiler chicks. Poult. Sci., 60: 2306-2315.

Salmon, R.E.; H.L. Classen and R.K. McMillan (1983). Effect of starter and finisher protein on performance, carcass grade, and meat yield of broilers. Poult. Sci., 62: 837-845.

Savage , T.F.; J.A. Harper and E.D. Larsen (1984). Unselected responses to divergent genetic selection in Medium White Turkeys for semen yield. Poult. Sci., 63 (Suppl. 1): 176.(Abst.).

Savage, T.F. and L.W. Mirosh (1990). Reproductive performance of turkey breeder hens fed a yeast culture. Proc. 25th Annual Pacific NW Animal Nutrition Conf.

Savage, T.F.; H.S. Nakaue and Z.A. Holmes (1985). Effects of feeding a live yeast culture on market turkey performance and cooked meat characteristics. Nutr. Rep. Int., 31: 695-703.

Seaton, K.W.; O.P. Thomas; R.M. Gous and E.H. Bossard (1978). The effect of diet on liver glycogen and body composition in the chick. Poult. Sci., 57: 662-689.

Shehata, A.S.A. (1995). Productive performance of growing broiler chicks as affected by energy protein ratio and methionine levels. Ph.D. Thesis Fac. of Agric. Zagazig Univ.Zagazig. Egypt.

Siregar, A.P. and D.J. Farrell (1980). A comparison of the energy and nitrogen metabolism of starved ducklings and chicks. Br. Poult. Sci., 21: 203-211.

Snedecor, G.W. and W.G. Cochran (1982). Statistical Methods. 7th Ed. The Iowa State Univ. Press, Ames. Iowa, U.S.A.

Summers, J.D.; S. Lesson and D. Sprat (1988). Yield and composition of edible meat from male broilers as influenced by dietary protein levels and amino acid supplementation. Canadian Journal of animal Science, 68(11): 241-248.

Tidwell, N.M., Z.B. Johnson and P.W. Waldroup (1988). Energy and amino acid programs for male and female broilers grown separately. Poultry Sci., 67 (Suppl. 1): 39 (Abst.).

Wiseman, J. (1988). Nutrition and carcass fat. Poultry International , July, pp. 12-13.

Zanusso, J.T.; de. Oliveira-RFM; J.L. Donzele; R.A. Ferreira; H.S. Rostagno; R.F. Euclydes; S.R. Valerio and de-Oliveria-RFM. (1999). Metabolizable energy levels for broilers (1 to 21 days) maintained under a thermoneutral environment. Revista-Brasileira-de-zootecnia. 28:5, 1068-1074.

J. Agric. Sci. Mansoura Univ., 27 (2), February, 2002

# استجابة البط المسكوفى لمستويات مختلفة من طاقة الغذاء وبيئة الخميرة

محمد سعيد محمد سامى ، سعد الدين أحمد يس ، جمال منصور الملاح
قسم تغذية وانتاج الحيوان والدواجن – المركز القومى للبحوث – الدقى – مصر

تهدف هذه الدراسة إلى معرفة استجابة البط المسكوفى لعلائق مختلفة فى نسبة الطاقة وبيئة الخميرة على الأداء الانتاجى وصفات الذبيحة والتحليل الكيماوى للذبيحة. وقد اشتملت الدراسة على ١٥٠ كتكوت بط مسكوفى عمر يوم ، قسمت إلى خمس معاملات تجريبية واشتملت كل معاملة على ثلاثة مكررات (١٠/مكرر)، تم تغذيتها على علائق مرتفعة ومنخفضة الطاقة (٢٩٣٠، ٢٧٣٠ كيلو كالورى طاقة ممثلة/كجم، للبادى، و(٣٠٣٠، ٢٤٧٠ كيلو كالورى طاقة ممثلة /كجم) للنامى مع كل مستوى من بيئة الخميرة وقد استمرت التجربة لمدة ١٢ اسبوعا.
وقد أوضحت النتائج المتحصل عليها :

تحسن معنوى فى وزن الجسم والزيادة الوزنية خلال فترة البادى وغير معنوى أثناء فترة النامى للمجاميع التى غذيت على علائق عالية الطاقة كذلك لوحظ زيادة فى كمية المأكول للمجاميع التى تغذت على علائق منخفضة الطاقة (أثناء فترة النمو) بينما أدت التغذية على علائق عالية الطاقة إلى تحسن معنوى فى معدل التحويل الغذائى. زادت النسبة المئوية لكل من وزن الذبيحة والأجزاء المأكولة ودهن البطن ومحتوى الجسم من الدهن بالتغذية على المستويات العالية من الطاقة.

كما أعطت مستويات الخميرة المضافة قيما أفضل فى الأداء الانتاجى خاصة بالتغذية على علائق منخفضة الطاقة أثناء فترة النمو، ولم يكن لها تأثير عكسى على بيانات الذبيحة. انخفض محتوى بروتين ورطوبة الذبيحة بشكل معنوى بينما زاد محتوى الدهن بالتغذية على علائق عالية الطاقة.

أفضل كفاءة اقتصادية كانت للمعاملة التى غذيت على علائق عالية الطاقة (بادى) ومنخفضة الطاقة (نامى) بينما تحسنت الكفاءة الاقتصادية باضافة الخميرة لعلائق منخفضة الطاقة أثناء فترة النمو.