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# PERFORMANCE AND CARCASS CHARACTERISTICS OF YOUNG RABBITS FED VARYING LEVELS OF SOLDIER FLY LARVAE MEAL

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Target Audience: Animal nutritionists, livestock farmers and research scientists.

## ABSTRACT

Investigation was carried out on the performance and carcass characteristics of young rabbits fed graded levels of soldier fly larvae meal (SFLM). SFLM was incorporated into the rabbits diet at 0, 3, 6, 9 and 12% levels. There was a progressive non-significant decrease in the gain (DWG) showed no significant differences between the control and the rabbits fed SFLM up to 6% level. Feed conversion efficiency (FCE) showed that treatments A, B, and C were superior to the control diet up to an inclusion level of 6% SFLM. The dressing percentage of rabbits on Diet C (6% SFLM) had the highest mean value (63.3%). Hence, SFLM inclusion levels should not exceed 6% in the diets of rabbits. Also incorporation of SFLM in rabbit diets had no adverse effects on the carcass and organ weights of rabbits.

Key words: Performance, carcass, soldier fly larvae meal, rabbits, organ weight.

## DESCRIPTION OF PROBLEM

Rabbit production as a substitute for beef and poultry is becoming important in Nigeria. Its production on commercial scale is fast becoming popular probably because of its minimal requirements for production - small space for rearing, short gestation period, short generation interval, reaching of slaughter age within a short period with low mortality rate, no need for storage of the meat being one meal size and its meat can be consumed unrestricted by religious taboos.

The high cost, non-availability and occasional adulteration of conventional feed ingredients, particularly protein supplements like soyabean meal, fishmeal and groundnut cake used in formulating feed militate against large scale production of rabbits in Nigeria. In order to reduce the cost of production therefore, the nutritional potentials of unconventional feed sources like soldier fly larvae meal needs to be investigated. Soldier fly larvae are readily available and easy to harvest, especially where laying birds are kept in cages and

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droppings are free from shavings. The house fly larvae was suggested by (1,2) as a means of salvaging part of nitrogen content of manure and providing protein source for use in livestock rations. (3,4) fed housefly larvae meals to broilers and layers repectively and recommeded its use up to a level of 66.70% in poultry ration. (5) showed that feeding soldier fly larvae meal in broilers could replace fishmeal up to 75% inclusion without adverse effects.

This study was therefore carried out to investigate the performance and carcass characteristics of young growing rabbits when fed varying levels of soldier fly larvae meal as a replacement for fish meal.

## MATERIALS AND METHODS

The soldier fly larvae used in this study were collected from the droppings under caged layers free of shavings. They were harvested, washed, dried and ground into a meal using hammer mill before incorporating them into the ration. Five isonitrogenous diets were formulated using fish meal as the reference protein source in the control diet A. In diets B, C, D and E, 3, 6, 9 and 12% respectively of the soldier fly larvae (SFLM) were incorporated into the experimental ration as shown in Table 1.

**Table 1. Percentage composition of ingredients in the experimental diets**

| | Diets | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | E |
| Maize | 53.88 | 50.97 | 51.62 | 52.28 | 52.96 |
| Wheat bran | 6.66 | 7.38 | 6.70 | 6.40 | 5.84 |
| Groundnut cake | 19.96 | 22.15 | 19.00 | 15.80 | 12.70 |
| Fish Meal | 3.00 | — | — | — | — |
| Maggot Meal | — | 3.00 | 6.00 | 9.00 | 12.00 |
| Corn bran | 12.25 | 12.25 | 12.25 | 12.25 | 12.25 |
| Oyster Shell | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Bone Meal | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| Palm Oil | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Premix | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| DL Methionine | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| <u>Calculated analysis</u> | | | | | |
| Crude Protein | 19.03 | 19.12 | 19.14 | 19.14 | 19.18 |
| Metabolisable (Kcal/kg) | 2975.62 | 2955.72 | 2976.73 | 3003.87 | 3029.46 |
| <u>Determined analysis</u> | | | | | |
| Crude Protein (%) | 19.32 | 19.28 | 19.34 | 19.34 | 19.44 |
| Crude fibre (%) | 5.63 | 6.67 | 6.54 | 6.68 | 6.73 |
| Ether extract (%) | 5.23 | 6.54 | 8.24 | 9.32 | 10.63 |

Vitamin Mineral premix supplied per kg diet; Vitamin A 10,000IU; Vitamin E 10mg, Vitamin $B_1$, 1.6mg; Vitamin $B_2$ 3.2mg; Vitamin $B_6$ 2.4mg; Vitamin $B_{12}$ 8mg; Folic acid 0.6mg; Pathothenic acid 14.4mg; Choline chloride 80mg; Mg 0.25g; Mn 120mg; Fe 48mg; Cu 0.4mg; 12.40mg; Se 100mg.

A total of 40, eight week old New Zealand White rabbits were randomly allotted into five treatment groups each with two replicates consisting of four rabbits per replicate. The rabbits were housed in cages with wire screen raised to a height of 90cm from the concrete floor. They were weighed at the commencement of the experiment and subsequently at weekly intervals in the morning before feeding. The record of feed intake was also taken. They were fed and watered *ad libitum*. *Tridax procumbens* of equal amount was served to all rabbits in the evening to supplement the ration. The experiment was conducted for eight weeks. At the end of eight week experimental period, two rabbits per replicate making four rabbits from each treatment were selected for carcass evaluation. The rabbits were weighed individually, slaughtered and scalded in hot water to facilitate removal of the fur. The heads and legs were cut off, before the rabbits were dissected and the internal organs separated. Each carcass was weighed and the carcass yield was calculated from the weight of carcass expressed as a proportion of the liveweight. The lungs, kidneys, heart and liver were also weighed and each expressed as g/100g carcass weight.

All data collected were subjected to analysis of variance (6) significant differences between treatment means were determined using the Duncan's multiple range test (7).

## RESULTS AND DISCUSSION

### Feed Intake, Body Weight Gain and Feed Conversion Efficiency

The results of daily feed intake (DFI), daily body weight gain (DWG) and feed conversion efficiency (FCE) obtained are shown in Table 2. The highest daily feed intake of 80.35g was observed in treatment B (3% SFLM) while the lowest was observed in treatment E. There was a progressive non-significant decrease in the DFI with increasing levels of SFLM in the ration (P>0.05). This shows that the rabbits were not only affected by the energy content of the diets but by the palatability of the feed. This observation agrees with the reports of (2, 3) who observed a depression in feed intake with increasing

**Table 2: Feed intake, body weight changes and feed conversion efficiency of rabbits**

| Parameters | A | B | C | D | E |
|---|---|---|---|---|---|
| Numbers of Animals | 8 | 8 | 8 | 8 | 8 |
| Avg. daily feed intake (g) | 79.20±3.82 | 80.35±6.72 | 77.95±3.32 | 77.64+6.93 | 76.00+4.10 |
| Avg. daily liveweight gain (g) | 20.17±3.75$^a$ | 20.07±2.21$^a$ | 19.80±6.01$^b$ | 12.80+0.01$^b$ | 11.84+1.41$^c$ |
| Feed conversion efficiency (feed/gain) | 3.93±0.21$^a$ | 4.00±0.06$^a$ | 3.94±0.15$^a$ | 6.07+0.61$^b$ | 6.42+0.12$^c$ |
| Mortality | — | — | — | — | — |
| Cost of feed (₦/kg) | 21.86 | 18.56 | 19.44 | 20.03 | 20.63 |
| Feed cost per kg gain (₦/kg) | 85.91 | 74.24 | 76.59 | 121.58 | 132.44 |

abc: Data with different superscripts in the same row differs significantly (P>0.05) levels of maggot meal in broiler diets. The daily weight gain (DWG) showed no significant differences between the control and the rabbits fed on SFLM up to 6% level. The rabbits placed on treatments D and E (9 and 12% SFLM) had significantly lower weight gain than other treatments ($P<0.05$). The feed conversion efficiency (FCE) showed that treatments A, B and C were superior to treatment D and E ($P<0.05$). This indicates that the SFLM should not exceed 6% inclusion level as a result of the depression observed in weight gain and feed conversion efficiency.

The feed cost per kilogram of control diet A was the highest while that for treatment E was the lowest. On the other hand, the cost per kilogram weight gain of the rabbits on diets B and C were compared with those on the control diet. No mortality occurred throughout the period of study. Thus the lowest total feed cost per kilogram liveweight gain was in favour of SFLM substituted diets.

## Carcass and Organ Weights

The results of carcass and organ weights are presented in Table 3. The liveweights of the rabbits decreased with increasing levels of soldier fly larvae meal (SFLM) in the diets. Rabbits on 3% SFLM had the highest liveweight

**Table 3: Carcass and organ weights of young rabbits fed varying level of soldierfly larvae meal**

| Parameters | A | B | C | D | E |
|---|---|---|---|---|---|
| Number of animals | 4 | 4 | 4 | 4 | 4 |
| Liveweight (g) | $1550.00\pm0.00^{b}$ | $1561.00\pm1.41^{a}$ | $1537.50\pm3.54^{c}$ | $1553.00+4.26^{b}$ | $1259.50+1.41^{d}$ |
| Carcass weight (g) | $962.10\pm3.34^{a}$ | $972.50\pm3.54^{a}$ | $969.50\pm0.71^{a}$ | $925.00+7.07^{b}$ | $657.50+3.54^{c}$ |
| Dressing % | $62.10\pm0.07^{b}$ | $62.30\pm0.42^{ab}$ | $63.06\pm0.14^{a}$ | $59.55+0.56^{c}$ | $52.15+0.21^{b}$ |
| Lung | $0.61\pm0.03^{ab}$ | $0.58\pm0.00^{b}$ | $0.69\pm0.05^{a}$ | $0.65+0.01^{ab}$ | $0.58+0.03^{b}$ |
| Kidney | $0.74\pm0.03^{b}$ | $0.70\pm0.01^{a}$ | $0.73\pm0.02^{a}$ | $0.65+0.01^{b}$ | $0.74+0.02^{a}$ |
| Heart | $0.34\pm0.02^{a}$ | $0.34\pm0.01^{a}$ | $0.32\pm0.06^{a}$ | $0.32+0.00^{b}$ | $0.27+0.04^{a}$ |
| Liver | $3.15\pm0.00^{b}$ | $3.15\pm0.07^{a}$ | $2.40\pm0.14^{c}$ | $2.25+0.07^{c}$ | $2.80+0.00^{b}$ |

*abc: Means on each row with different superscripts differ significantly ($P<0.05$)

while those on 12% SFLM had the lowest liveweight. The carcass weight also followed the same trend as the liveweight, rabbits on diets A, B and C showed no significant differences ($P>0.05$) while those on diets D and E decreased in the order. This could be attributed to the reduction in feed intake and weight gain resulting from poor feed utilization with increasing levels of SFLM in the diets. (8) observed that dietary protein quality and level in diets improve broiler performance. The dressing percentage showed that rabbits on diet C (6% SFLM) had the highest value (63.3%) followed by those on diets B, A, D and E. This shows that incorporation of SFLM in rabbits diet at up to 6% level improved tissue synthesis.

The weights of the lungs, kidneys, heart and liver expressed as a percentage of the carcass weight followed no consistent pattern. These organs were normal in appearance and the weights obtained fell within the normal ranges reported (9). This shows that incorporation of SFLM in rabbits diets had no adverse effects on the carcass and organ weights of rabbits.

## CONCLUSION AND APPLICATION

From the results of this study it can be concluded that SFLM may be substituted for fish meal in rabbits up to 6% inclusion level with optimum growth level and no adverse effect on the health of rabbits. The use of SFLM as a replacement for fish meal in rabbit ration will reduce the cost of production and hence cost of meal to consumers.

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