REFERENCES
REFERENCES


PERFORMANCE OF CROSS BRED PIGS UNDER GOA CONDITION
II. STUDIES ON CARCASS CHARACTERISTICS

A.R. Bhattacharyya and R.N.S. Sundaram
ICAR Complex for Goa, (CPCRI) Ela, Old Goa-403402, India

Pork is one of the most important sources of meat for the Goan population. Rearing non descriptive pigs under scavenging condition is a traditional practice in the rural part of this State. Since the growth and production performance of these local pigs was unsatisfactory, cross breeding programme with Large White Yorkshire was initiated. In an earlier report (Bhattacharyya et al., 1983), the reproductive parameters and growth performance of the F1 cross bred pigs were published. In the present paper the carcass characteristics of the crossbred pigs are reported. Three F1 cross bred males maintained in field conditions under scavenging and supplementary feeding, attained an average body weight of 59 kg at the 48th week indicating much better growth performance of crosses, than local pigs. The daily average weight gain of 175 g for the cross bred pigs in this study under semi-scavenging condition was found much better than that of 114 g for the indigenous pigs in stall fed condition as reported by Saseendran and Rajagopalan (1982). From the reports on carcass weight and characteristics of the pure bred Yorkshire (Ramaswami et al., 1985) it can be seen that the dressing percentage at 60 kg body wt.

Table 1. Carcass characteristics of F1 cross bred pigs

<table>
<thead>
<tr>
<th>Trait</th>
<th>Measurement</th>
<th>Trait</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcass length (cm)</td>
<td></td>
<td>Girth (cm)</td>
<td>90±1.73</td>
</tr>
<tr>
<td>Pin bone to shoulder</td>
<td>63±0.87</td>
<td>Height at loin</td>
<td>72±0.57</td>
</tr>
<tr>
<td>Snout to back spine</td>
<td>120±0.16</td>
<td>Height at back</td>
<td>78±1.73</td>
</tr>
<tr>
<td>Fore head to shoulder</td>
<td>27±0.48</td>
<td>Snout diameter</td>
<td>21±1.16</td>
</tr>
<tr>
<td>Shoulder</td>
<td>36±0.51</td>
<td>Weight (kg)</td>
<td></td>
</tr>
<tr>
<td>Loin to Loin</td>
<td>60±0.86</td>
<td>Head weight</td>
<td>4±0.46</td>
</tr>
<tr>
<td>Loin to rump</td>
<td>21±1.39</td>
<td>Shoulder weight</td>
<td>6±0.63</td>
</tr>
<tr>
<td>Face length</td>
<td>18±1.15</td>
<td>Bacon</td>
<td>5.3±0.46</td>
</tr>
<tr>
<td>Ham</td>
<td>21±0.87</td>
<td>Ham</td>
<td>5±0.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Side</td>
<td>5.8±0.55</td>
</tr>
</tbody>
</table>
was 77% for pure bred Yorkshire, while in the present study it was 64.5% in cross bred pigs, which were reared under semi scavenging condition. Thus, it can be seen that in comparison, the cross bred pigs in this present report performed well. Carcass characteristics of F1 cross bred, slaughtered at 52nd week is presented in table 1.

From the carcass characteristics it appeared that the growth of cross bred male pigs were quite promising, however, studies with more number of crossbreds are necessary to establish the norms.

REFERENCES


LOW COST POULTRY RATIONS BASED ON INGREDIENTS AVAILABLE IN GOA

I. STARTER RATIONS FOR EGG TYPE CHICKS
N.S. Nair, R.N.S. Sundaram and A.R. Bhattacharyya
ICAR, Research Complex for Goa (CPCRI), Old Goa 403 402

Two low cost starter rations for egg type chicken were formulated incorporating locally available ingredients viz. rice bran, brewery grain waste, molasses, fish meal, oyster shells etc., and the efficiency and economics were tested with a control ration. Both the test rations were found to be better than the control ration, but the test ration containing the combination of rice bran and brewery grain waste was found to be most efficient and economical (2%).

INTRODUCTION

The cost of feeding represents and will probably always represent major part (70-80%) of the whole poultry production cost (Muller 1972). Chicken feed with large portions of coarse grains is not only costly but also scarce as coarse grains constitute major food items for human use also. In Goa coarse grains and oil cakes, the major ingredients in the poultry feed, are not produced locally. As a result, the conventional poultry feed is further costlier in the Territory. On the other hand, rice bran, brewery grain waste, cane molasses, fish meal and oyster shell, are available in plenty at a cheaper rate since these are produced locally as by-products. Several investigators have reported the use of these by-products in different proportions in poultry rations (Mchadevan et al. 1975; Din et al. 1975; Panda and Gupta, 1965; Ott et al 1942. Rosenberg, 1953; Sundaram et al., 1960).

However, there is no report from Goa regarding the formulation of cheap ration using locally available ingredients and by-products. The present paper is the first report on the successful formulation and testing of economic starter rations incorporating local ingredients of the Territory.

MATERIALS AND METHODS

Two test rations for layer type chicks were prepared incorporating local ingredients. The feed formulae are given in Table 1. A commercial chick ration was taken as a standard ration for comparison.
A feeding trial was conducted at the Government Poultry Farm, Ela, Old Goa for a period of 8 weeks. Seventy five one-day-old HH 260 chicks (White Leghorn strain cross) were randomly allotted to two test groups and a standard group having 25 chicks each.

Feed and water were supplied ad libitum. The chicks were vaccinated against Ranikhet Disease with Lasota strain vaccine and reared in brooder cages under identical and optimum management conditions.

Bi-weekly body weight, feed intake and mortality were recorded during the entire experimental period. The feed efficiency and feeding cost was calculated for comparison. The data was analysed as per Snedecor and Cochran (1967).

## Table 1. Feed formulae of test rations

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Percentage inclusion</th>
<th>Test Ration I</th>
<th>Test Ration II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow maize</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Rice bran</td>
<td>28</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Brewery grain waste</td>
<td>—</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Groundnut cake</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Fish meal</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Molasses</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Shell grit</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Bone meal</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mineral &amp; Vit. mixture</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

All the three rations were analysed as per AOAC (1970) methods and the results are presented in Table 2.

## Table 2. Chemical composition of chick rations

<table>
<thead>
<tr>
<th>Rations</th>
<th>C.F.</th>
<th>C.P.</th>
<th>E.E.</th>
<th>NFE</th>
<th>Total ash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard ration</td>
<td>7.80</td>
<td>19.36</td>
<td>3.50</td>
<td>47.03</td>
<td>13.3b</td>
</tr>
<tr>
<td>Test ration I</td>
<td>10.02</td>
<td>17.66</td>
<td>3.21</td>
<td>46.55</td>
<td>12.76</td>
</tr>
<tr>
<td>Test ration II</td>
<td>11.41</td>
<td>18.26</td>
<td>3.48</td>
<td>46.19</td>
<td>13.42</td>
</tr>
</tbody>
</table>

## Table 3. Comparative efficiency of chick rations

<table>
<thead>
<tr>
<th>Chick ration</th>
<th>Bi-weekly body weight (g)</th>
<th>Av. gain in body weight (kg)</th>
<th>Av. feed intake (kg)</th>
<th>Av. feeding cost Rs./bird</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IInd</td>
<td>IVth</td>
<td>VIIth</td>
<td>VIIIth</td>
</tr>
<tr>
<td>Standard ration</td>
<td>54.7</td>
<td>120.6</td>
<td>201.0</td>
<td>266.5</td>
</tr>
<tr>
<td>Test ration I</td>
<td>53.7</td>
<td>103.8</td>
<td>136.9</td>
<td>163.5</td>
</tr>
<tr>
<td>Test ration II</td>
<td>47.7</td>
<td>95.4</td>
<td>191.2</td>
<td>265.4</td>
</tr>
</tbody>
</table>

Averages within the same column having same superscripts are not significantly different P < 0.05.
RESULTS AND DISCUSSION

The results of the feeding trial represented in Table 3.

GROWTH RATE:

The average bi-weekly body weight showed significant difference (P 0.05) among the groups up to the 6th week. But it was interesting to note that there was no significant difference during the 8th week (Table 3). This is indicative of a slower growth rate of both the test ration groups at the initial stages. This lower growth rate in the initial stages may be due to less utilization of test rations by baby chicks probably because of their higher fibre content (Table 2). However improved body weight gain from 6th week compensates the initial slow growth rate & this could possibly be due to the attainment of better digestive ability and adaptability of the chicks to the type of feed with increase in age.

FEED CONSUMPTION

Feed consumption was highest in the group fed with test ration I followed by standard ration. The lowest feed intake was observed in the group fed with test ration II (Table 3). But these differences were not statistically significantly.

FEEDING COST

The feeding cost calculated had indicated that test ration II was most economical (28% more than standard). The test ration I was the least efficient. However, it was found more economical (9% more) than the standard ration (Table-3).

MORTALITY:

The mortality was within normal range and no significant difference among the groups was observed.

The overall result had shown that rations formulated with local ingredients were more economical than conventional poultry feeds. The ration incorporating rice bran and brewery grain waste was found most efficient and economical; and this could be a suitable ration for the economic poultry production in the territory.

REFERENCES


Din, M.G.; Sundem, M.L. and Bird H.R. (1975) Poultry Sci. 54 : 1754 (abstract)

Mahadevan, P; Pandittesekeya, D. G; White, J. S. L. and Arumugam Vr. (1957) Poultry Sci. 36 : 286-295

Muller, Z.O. (1972) FAO Project report Poultry Sci. 57 : 740-746


LOW COST POULTRY RATIONS BASED ON INGREDIENTS AVAILABLE IN GOA:

II. GROWER RATION

N. S. NAIR, R. N. S. SUNDARAM & A. R. BHATTACHARYYA
ICAR Research Complex for Goa (CPCRI)
Old Goa-403 402

ABSTRACT

The low cost, economic grower rations formulated by incorporating local by-products like rice bran and brewery grain waste as partial replacement of costly maize was found more economic (16%) than the standard commercial ration.

INTRODUCTION

The cost of pullets at the point of lay is one of the major factors affecting the cost of production of the egg. Therefore, it is essential that efficient feeding practices and good management must be followed during growing stage of the pullets to produce economical pullets which will have good growth, production and livability during the laying stage. Number of reports are available on feeding systems followed for grower pullets of egg and meat types. One of the methods followed was adding ingredients with more fibre content to formulate low energy grower rations. Following this principle a study has been conducted using feed formulation incorporation locally available by-products as feed ingredients partially replacing maize in order to reduce the cost without adversely affecting the production efficiency.

MATERIALS AND METHODS

Two low cost grower rations (GR 1 and GR 2) were formulated incorporating the locally available cheap ingredients like rice bran, brewery grain waste, fish meal, molasses and shell grit. The feed formulae are given in Table 1.

To reduce the cost of feed incorporation of the costly ingredient namely maize was brought down from 15% in GR 1 to 10% in GR 2 with simultaneous increase of brewery grain waste from 10% (GR 1) to 15% (GR 2). A commercial grower ration was taken as standard for comparison.
Averages within the same column having same superscripts are not significantly different $P < 0.05$.

With respect to cost of feeding, it was found that GR 1 was 16.28% more economical than standard ration. The better efficiency of GR 1 was also evident from the findings of early maturity (age at 1st egg-125 days) which was 6 days earlier than control and 15 days earlier than GR 2 group. The average egg production up to 26 weeks was the highest (24.1/ hen) in the same group. Feeding cost calculated for the group was the lowest (Rs. 7.60). Further it can be seen from Table 3 that GR 2 was inferior to both GR 1 and SR as GR 2 groups had lowest average body weight at 18th week (950.9 g) and delayed maturity (age at 1st egg 140 days). However, from the cost point of view GR 1 was slightly cheaper than the standard ration. Low efficiency of GR 2 might be due to comparatively higher fibre content in the ration. Similar results were obtained by Sugandi et al. (1979) using feed formulation with 10% and 15% yellow maize. From these results it is apparent that locally available by-products like rice bran and brewery grain waste can be profitably incorporated in grower rations, particularly replacing costly maize to bring down the cost of feeding replacement pullets considerably.

### REFERENCES


### Table 2: Chemical composition of grower ration

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Ration</th>
<th>C.P.</th>
<th>E.E</th>
<th>NE</th>
<th>TOTAL ASH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GR. I</td>
<td>10.42</td>
<td>16.32</td>
<td>3.26</td>
<td>47.37</td>
</tr>
<tr>
<td>2</td>
<td>GR. II</td>
<td>12.96</td>
<td>17.41</td>
<td>2.77</td>
<td>47.31</td>
</tr>
<tr>
<td>3</td>
<td>Control (SR)</td>
<td>8.41</td>
<td>16.25</td>
<td>3.86</td>
<td>48.10</td>
</tr>
</tbody>
</table>

### Table 3: Comparative efficiency of grower rations.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Rations</th>
<th>Bi-weekly body weight (g)</th>
<th>Av. Feed intake (Rs./ egg)</th>
<th>Age at 1st egg (Kg/bird) (days)</th>
<th>Average egg production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>581.5a 591.1a 655.4a 753.9a 886.1a 1002.6a</td>
<td>5.0a 9.15a</td>
<td>131 18.2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>GR 1</td>
<td>539.4a 35.1a 702.9a 773.1a 950.9a 1097.9a</td>
<td>5.8b 7.66</td>
<td>125 24.2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>GR 2</td>
<td>536.8a 616.1a 666.0a 670.7b 849.9a</td>
<td>950.9c 6.4c</td>
<td>140 17.6</td>
<td></td>
</tr>
</tbody>
</table>
UTILIZATION OF CASHEW APPLE WASTE IN DAIRY CATTLE FEED

R.N.S. SUNDARAM
ICAR Research Complex for Goa, Central Plantation Crops Research Institute, Ela, Old Goa-403 402, India

ABSTRACT

Cashew apple waste (CAW), a seasonal waste product, was analysed and incorporated in the concentrate mixture at 10% level of replacement of groundnut cake. Effect of feeding CAW on milk production was studied in Gir cows for 90 days experimental period. The average daily DM intake was 8.92 and 8.95 kg and milk yield was 5.17 and 5.19 kg for the experimental and control groups, respectively, indicating no significant difference between the groups. The study suggested that cashew apple waste can be incorporated in dairy cattle feed at 10% level without any adverse influence on milk production.

Cashew apple is one of the most commonly available seasonal fruit in south India. In certain areas like Goa, the fruit is utilised for the extraction of juice and remainder is discarded as waste. More than 100 tonnes of this by-product is avail-

Fig. 1. Cashew apple showing spherical bulb.

124
able in Goal, during the season (Feb.-May). Reports on its utilisation as cattle feed are very limited. An attempt was made to evolve a ration incorporating cashew apple waste (CAW) for dairy cattle and study the effect on milk production.

Fresh CAW, collected from the country distillation units, was sun-dried for 4 days, ground and stored for incorporation in cattle feed. Control and experimental feeds were formulated (Table 1) and analysed for chemical composition\(^2\). Eight Gir cows, in early lactation and with similar body weights were selected and divided into 2 groups of 4 animals each and were fed with control and experimental concentrate feed respectively for a period of 105 days including 15 days preliminary period. Both the groups were maintained under identical managemental conditions. The ration consisted of 2 kg straw, 22 kg green grass and 2 to 4 kg concentrate. The animals were fed as per recommended standards\(^3\) to meet the maintenance and production requirements. Data on milk yield, DM intake and feed cost of milk production were recorded and statistically analysed\(^4\).

Proximate analysis of CAW, control and experimental concentrate mixtures is presented in Table 2. The composition of CAW was comparable to by products like wheat bran. In cashew apple meal, however, lower value of CP (6.4%) has also been reported earlier\(^5\). In the present feeding trial, CAW partly replaced the costly
Table 1. Ingredients of control and experimental concentrate feed

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Control (Feed %)</th>
<th>Experimental (Feed %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Groundnut cake</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Cotton seed cake</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Rice bran</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Molasses</td>
<td>10</td>
<td>9.5</td>
</tr>
<tr>
<td>Cashew apple waste</td>
<td>—</td>
<td>10</td>
</tr>
<tr>
<td>Urea</td>
<td>—</td>
<td>1.5</td>
</tr>
<tr>
<td>Mineral mixture</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Salt</td>
<td>1</td>
<td>—</td>
</tr>
</tbody>
</table>

Table 2. Chemical composition of experimental feed (% on DM basis)

<table>
<thead>
<tr>
<th>Feed</th>
<th>CF</th>
<th>EE</th>
<th>CP</th>
<th>T. Ash</th>
<th>NFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cashew apple waste</td>
<td>14.32</td>
<td>4.04</td>
<td>10.50</td>
<td>3.72</td>
<td>69.00</td>
</tr>
<tr>
<td>Control concentrate mixture</td>
<td>16.10</td>
<td>3.44</td>
<td>14.90</td>
<td>10.28</td>
<td>55.26</td>
</tr>
<tr>
<td>Experimental concentrate mixture</td>
<td>15.24</td>
<td>2.83</td>
<td>16.16</td>
<td>9.40</td>
<td>56.50</td>
</tr>
</tbody>
</table>

Table 3. Production performance of experimental and control animals

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Control</th>
<th>Experimental</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Average milk yield (kg/cow/day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Preliminary period</td>
<td>5.81±1.64</td>
<td>5.95±0.97</td>
</tr>
<tr>
<td>(b) Experimental period</td>
<td>5.19±1.01</td>
<td>5.17±0.74</td>
</tr>
<tr>
<td>II. DM intake (kg/day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Concentrate</td>
<td>2.67±0.10</td>
<td>2.71±0.04</td>
</tr>
<tr>
<td>(b) Grass (NB21)</td>
<td>4.46±0.03</td>
<td>4.44±0.12</td>
</tr>
<tr>
<td>(c) Straw</td>
<td>1.80±0.01</td>
<td>1.80±0.02</td>
</tr>
<tr>
<td>(d) Total</td>
<td>8.92±0.12</td>
<td>8.95±0.15</td>
</tr>
<tr>
<td>II. Cost (Rs) of feed consumed/kg of milk production</td>
<td>1.94</td>
<td>1.77</td>
</tr>
</tbody>
</table>

Feed ingredient groundnut cake with a view to reduce the feed cost without affecting the feed quality. Chemical composition with regard to major nutrients in the control and experimental feeds was almost similar except that CP was slightly higher in experimental feed. The average daily milk yield of control and experimental groups
during the preliminary period was 5.81 and 5.95 kg whereas during the experimental period it was 5.19 and 5.17 kg, respectively (Table 3), indicating that there was no significant difference in milk yield between the groups. The DM intake (8.92 and 8.95 kg, respectively) was also similar in both the groups. Although cashew apple contained 0.35% tannin, incorporation of the by-product CAW at 10% level had no undesirable influence on health and production of the animals during the trial period, indicating that CAW could be utilized as an ingredient in dairy cattle feed.

REFERENCES


A NOTE ON THE INCIDENCE OF HAEMORRHAGIC DISEASE IN RABBITS IN INDIA

R.N.S. Sundaram, A.R. Bhattacharyya, N.S. Nair and M. Vas
ICAR Research Complex for Goa, Ela, Old Goa - 403 402, India

An epidemic among meat type rabbits in India, with 100% mortality, simulating viral haemorrhagic disease of China and Mexico, has been described.

The outbreak of an epidemic was observed during June, 1990, in this unit. Initially, it was observed that adult animals were dull, went off feed and did not drink water. Subsequently, a febrile condition with temperature of 49° C along with lacrimation and nasal discharge followed by dyspnoea was observed. Affected animals died within 24 to 48 hours after onset of symptoms. At time of death the animals showed bleeding from the nostrils (Figure 1). The outbreak lasted 10 days, during which 100% mortality was observed in adult animals. Although all the animals were housed in the same rabbitry, those younger than 12 weeks of age remained healthy and did not show any symptoms.

In the beginning, feed poisoning in the formulated diet was suspected. The feed was withdrawn and the animals were given only tender grass and cabbage leaves. However, no change was observed in the disease pattern. Febrile symptoms continued with anorexia and dyspnoea followed by mortality. Antibiotics and sulpha drugs were also administered regularly, without any favorable response.

Post mortem examination revealed profuse hemorrhage in the lungs (Figure 2), inflammation with hemorrhagic streaks in the liver and petechial hemorrhage in the small intestine and subcutaneous tissue. Blood samples collected from the lungs and cultures made from lung tissue were negative for pasteurella or any other bacterial infection. In view of this, as well as symptoms and course of the disease, a viral infection was suspected. However, this could not be tested, for want of a specific antigen and facilities. Literature pertaining to rabbit diseases was extensively reviewed. No literature or information was available on the occurrence of any hemorrhagic disease of rabbits in India. However, in a report from outside India, a hemorrhagic disease with similar symptoms and post mortem findings named Viral Haemorrhagic Disease of the rabbit was described by Patton (1989) as occurring in China, Mexico and some European countries. From this article, it appeared that the epidemic under report could possibly be due to a similar type of viral infection.

Acknowledgement

The authors are grateful to Dr. S. Ray, Director of Animal Husbandry and Veterinary Services, Govt. of Goa, for his valuable guidance and help in the investigation. They are also thankful to Dr. D.G. Dhandar, Officer on Special Duty, ICAR Research Complex for Goa, for providing facilities.

Reference

The economy of milk production depends upon feeding, as feeding constitutes more than 80% of the milk production. The balanced concentrate feed for dairy cattle usually consists of maize, wheat bran and oil cakes, major ingredients. In areas where ingredients are not locally produced, the extent of feeding is all the more high with the dependence from outside areas.

In the coastal belt where wheat be grown because of hot humid climatic condition, rice is the major crop cultivated round the year. In these areas agricultural by-products like bran, molasses, bagasse etc., are available in plenty. Incorporation of by-products and formulation of balanced livestock ration would facilitate livestock feeding in these areas.

The present paper is the report of successful formulation and feeding trial of a rice bran and molasses respectively.

**MATERIALS AND METHODS:**

Two test rations were prepared by completely replacing wheat bran and partially replacing maize with rice bran and molasses. The ingredients and percentage inclusion are presented in Table 1.

A feeding experiment was conducted at Government Livestock Farm, Goa, for a period of 90 days to test the efficiency of the test rations. Eighteen crossbred cows (Jersey x Red Sindhi) in the early lactation (60-90 days) having similar body weights were selected and randomly allotted to 3 rations (6 in each group). The feeding schedule was same in all the three groups. The concentrate feed to meet the production...
ction requirement as per Sen and Ray (1971).

The data on daily feed intake, and ion was recorded for the entire period. Milk fat content was recorded once a month. These data were analysed as per Snedecor and Cochran (1967).

RESULT AND DISCUSSION:
The feed intake, milk production and feed efficiency are presented in Table III.

PROXIMATE ANALYSIS:
It was noted that there was not much difference in the chemical composition except in the C. fibre (17.48% vs 13.36%) and total ash contents (13.71% vs 7.36%) which were higher in test rations (Table II) which could possibly be due to the high proportion of rice bran in the test rations.

FEED INTAKE
All the animals remained healthy throughout the experimentation. From the observations on the feeding trial given in Table III, it may be observed that the total dry matter intake (9.76, 9.03 and 9.12 kg) as well as the concentrate feed intake among the groups were not significantly different. This was indicative in that the inclusion of rice bran and molasses did not adversely affect the palatability or the acceptability of the ration.

The pattern of feed intake remained normal throughout the experimental period which showed that the digestibility was normal although there were differences in the ration ingredients.

MILK PRODUCTION
It can also be noticed from the table that there was no significant difference among the groups in daily average milk yield (6.23, 5.05 and 4.98 kg) or in the butter fat % (4.20, 4.31 and 4.28%). The difference in efficiency of production was also not significant. The pattern of lactation curve remained normal in all the groups throughout the experimental period. This indicated that the inclusion of these cheap ingredients had adversely affected neither the quantity nor the quality of milk.

Feed cost: On computing the economics it was found (Table III) that feeding cost/kg of milk production was Rs.1.54/kg in the group fed with control ration, and in the group fed with test rations I & II it was considerably lower viz Rs.1.32 and Rs.1.31 respectively. However, between the test rations no appreciable difference is observed.

The result clearly indicated that by inclusion of locally available cheap ingredients like rice bran and molasses in place of costly items like maize and wheat bran, the cost of concentrate feed for dairy cattle could be reduced considerably, without adversely affecting production. Therefore, for economic milk production in Goa as well as in other similar rice and sugar cane producing coastal areas, rice bran molasses can be profitably included up to 40% and 10% levels respectively for making balanced concentrate feed for milch animals.

Livestock Adviser 22

May-87
TABLE I.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Test Ration I</th>
<th>Test Ration II</th>
<th>Control Ration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group A</td>
<td>Group B</td>
<td>Group C</td>
</tr>
<tr>
<td>Cake</td>
<td>17</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>Cotton Seed Cake</td>
<td>15</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>Bran</td>
<td>30</td>
<td>40</td>
<td>—</td>
</tr>
<tr>
<td>St. bran</td>
<td>—</td>
<td>—</td>
<td>40</td>
</tr>
<tr>
<td>Sesame</td>
<td>10</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>Mix</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>100</th>
<th>100</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rs/kg</td>
<td>1.48</td>
<td></td>
<td>1.69</td>
</tr>
</tbody>
</table>

These rations were analysed as per A.O.A C. (1970) and the chemical composition is given in Table II.

TABLE II.

Chemical composition of the two test rations and control ration under trial.

<table>
<thead>
<tr>
<th>Moist</th>
<th>C. Prot.</th>
<th>CF</th>
<th>Ex. Ext.</th>
<th>T. Ash</th>
<th>NFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>in I</td>
<td>9.81</td>
<td>15.82</td>
<td>13.82</td>
<td>4.02</td>
<td>11.01</td>
</tr>
<tr>
<td>in II</td>
<td>9.61</td>
<td>15.12</td>
<td>17.48</td>
<td>3.97</td>
<td>13.71</td>
</tr>
<tr>
<td>rol</td>
<td>8.11</td>
<td>14.85</td>
<td>13.36</td>
<td>4.19</td>
<td>7.36</td>
</tr>
</tbody>
</table>

TABLE 3

Average Feed intake, milk production & feed efficiency: during trial period.

<table>
<thead>
<tr>
<th></th>
<th>Test Ration I</th>
<th>Test Ration II</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. D.M. intake cow/day (kg)</td>
<td>9.7&lt;sub&gt;a&lt;/sub&gt;</td>
<td>9.03&lt;sub&gt;a&lt;/sub&gt;</td>
<td>9.12&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Avg. Con. Feed intake cow/day (kg)</td>
<td>5.12&lt;sub&gt;a&lt;/sub&gt;</td>
<td>4.40&lt;sub&gt;a&lt;/sub&gt;</td>
<td>4.48&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Avg. milk yield cow/day (kg)</td>
<td>6.23&lt;sub&gt;a&lt;/sub&gt;</td>
<td>5.05&lt;sub&gt;a&lt;/sub&gt;</td>
<td>4.98&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Fat %</td>
<td>4.20</td>
<td>4.31</td>
<td>4.28</td>
</tr>
<tr>
<td>Efficiency of production (feed intake/kg milk production)</td>
<td>1.57&lt;sub&gt;a&lt;/sub&gt;</td>
<td>1.77&lt;sub&gt;a&lt;/sub&gt;</td>
<td>1.83&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Feed cost/kg milk production</td>
<td>1.32</td>
<td>1.31</td>
<td>1.65</td>
</tr>
</tbody>
</table>

The values with same superscript within rows in not significantly different.

Livestock Adviser 23

May-87
ABSTRACT

Two test rations were formulated by completely replacing wheat bran and partially replacing maize with rice bran @ 40% and 30% and molasses @ 10% levels. The efficiency of these test rations were compared with a control ration by conducting a feeding trial on dairy cattle for a period of 90 days. The results indicated that addition of 40% rice bran, and 10% molasses could considerably bring down feeding cost for milk production (Rs.0.34/kg milk) without any adverse effect.

REFERENCES


Feeds and Bye Products Resources of Goa for Livestock Feeding

R. N. S. Sundaram and A. R. Bhattacharyya
ICAR Research Complex for Goa, Old Goa 403 402

The territory of Goa has about 35,000 adult cows and 19,000 buffaloes which require 112 tones of concentrate feed every day. In addition to this, considerable amount of concentrate feed is also required for raising poultry and piggery. Although 36% of the land is under cultivation, mostly rice is grown in these areas; Coarse grains like maize, jowar etc., which are essential ingredients in livestock feed are not commonly cultivated; Consequently majority of the feed ingredients are brought from the neighbouring States. A survey conducted by the ICAR Research Complex Goa has revealed that 82% of the total maintenance expenditure in dairy units goes for feeding alone, indicating the necessity for identifying alternative methods to reduce the feed costs: Several agro industrial units and fish canning centres in Goa produce a large amount of bye products and waste materials. Utilization of these unconventional materials in the concentrate feed for partial replacement of costly ingredients will help to reduce the feed cost. With this view a survey to identify the availability of various bye products and waste materials was carried out.

Availability of various bye products and their approximate costs is furnished in Table I below.

Table I: Bye products resources of Goa.

<table>
<thead>
<tr>
<th>Sl: No.</th>
<th>Item</th>
<th>Qty available</th>
<th>Approx. costs/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Molasses</td>
<td>4000 tons</td>
<td>0.10</td>
</tr>
<tr>
<td>2.</td>
<td>Brewery grain waste</td>
<td>300 tons (DM)</td>
<td>0.70</td>
</tr>
<tr>
<td>3.</td>
<td>Rice bran</td>
<td>8000 tons</td>
<td>0.70</td>
</tr>
<tr>
<td>4.</td>
<td>Fishmeal</td>
<td>5000 tons</td>
<td>1.50 - 3.50</td>
</tr>
<tr>
<td>5.</td>
<td>Cashew apple waste</td>
<td>100 tons</td>
<td>0.20</td>
</tr>
</tbody>
</table>

FISHMEAL:

The 100 km long coastal line of Goa, gets 25,000 tons of fish per annum; 5000 tons of thrash fish is available which is sundried as fishmeal and exported to the neighbouring states. In addition to this there are 15 fish canning units which provides 25 tons of fish processing waste, which is discarded in the surrounding area creating health hazards.
MOLASSES:

The Co-operative sugar factory, with a crushing capacity of 1 lakh tons of cane per annum, produces 4000 tons of molasses. This can be utilised for partial replacement of cereals like maize and jowar, which are brought from the neighbouring states, to reduce the feed cost.

BREWERY GRAIN WASTE:

Sprouted barley grain is discarded as waste material after fermentation in the breweries. It has 18% crude protein and 20% crude fibre. Two large scale breweries located in the territory produces 1200 tons of brewery grain waste/annum.

RICE BRAN:

Paddy is the major food crop in Goa. 1,40,000 has of land is under paddy cultivation. Annually 8000 tons of rice bran is available as a bye product, which is cheaper (half the price) than wheat bran.

CASHEW APPLE WASTE:

A seasonal waste product available during summer months. The apple is used for the extraction of honey and the remnants are discarded. It has 10.2% crude protein and 14% crude fibre. Annually 100 tons of this waste is available which can be fed to pig and cattle. Dried waste has been incorporated at 10% level in cattle and satisfactory production performance has been obtained.

FLOUR MILLWASTES:

There are two commercial flour mills, producing atta and Besan; wastes from these factories are available for feeding pigs.

In addition to the above, fruit canning factory wastes like pineapple and mango wastes are available seasonally, which can be incorporated in pig mash to reduce the cost of feeding.

Table II. Chemical composition of bye products:

<table>
<thead>
<tr>
<th>Bye product</th>
<th>Moist</th>
<th>C.C.F</th>
<th>E.E.</th>
<th>C.P.</th>
<th>Total ash</th>
<th>N.E.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Brewery grain waste</td>
<td>80.9</td>
<td>20.6</td>
<td>3.5</td>
<td>17.9</td>
<td>3.7</td>
<td>54.3</td>
</tr>
<tr>
<td>2. Cashew apple waste</td>
<td>77.3</td>
<td>14.3</td>
<td>4.0</td>
<td>10.5</td>
<td>2.5</td>
<td>69.0</td>
</tr>
<tr>
<td>3. Bagasse</td>
<td>11.2</td>
<td>43.0</td>
<td>2.6</td>
<td>2.6</td>
<td>4.2</td>
<td>47.6</td>
</tr>
<tr>
<td>4. Fish meal</td>
<td>9.2</td>
<td>5.8</td>
<td>4.0</td>
<td>42.0</td>
<td>37.2</td>
<td>11.0</td>
</tr>
</tbody>
</table>

Besides the above, coconut oil cake and distillery wastes are also available in limited source by adopting the patented practices which are already available for incorporating these bye products in concentrate feed. Livestock maintenance expenditure can be reduced to an economic level.
CHEMICAL COMPOSITION AND DRY MATTER DIGESTIBILITY OF KARAD HAY (THEMEDA QUADRIVALIS)

R. N. S. Sundaram, A. R. Bhattacharyya, and H. K. Malviya.

ICAR Research Complex for Goa, (CPCRI, Ela Old Goa-403 402.)

Karad (Themeda quadrivalis) is a wild grass growing extensively in the laterite soil of region in Goa. It grows abundantly in the forest lands. Dry grass is harvested as December-January and stacked for feeding cattle during the summer months. It is a substitute for paddy straw in this territory. Therefore a study was made to ascertain the nutritive value of karad hay to find out as to what extent this preserved fodder can be.

Materials and Methods

Samples of karad hay and straw were collected from the stall, oven dried at 60°C for 8 rounds to pass through 20 mm mesh and analysed for proximate principles as per AOAC (1970). In vitro dry matter digestibility of karad and paddy straw samples was done in 20 mm culture tubes by two stage digestion trial technique (Tilley and Terry 1963). Noculum for the above study was obtained from bullocks maintained on sole roughage karad and filtered through 4 layered cheese cloth in a prewarmed flask. Nutrient was prepared as per Cheng et al (1955) and D.M. digestibility estimated as per Dutt et al (1962).

In vivo digestion trial was conducted on five Sindhi x Jersey cross bred bullocks of 4 to 5 age. Animals were maintained on karad hay for 28 days which included 21 days, collection period and 7 days collection period. Dry matter intake was ascertained for the during the preliminary period. Dung samples were collected daily during the collection period from individual animals, oven dried at 60°C and analysed for acid insoluble ash (A.I.R) digestibility was estimated by indicator technique using Acid Insoluble ash as indicator, IV and Talapatra 1962).

Results and Discussion

Crude protein, ether extract and total ash content of karad hay were 3.5, 1.68 and 10.5% that of paddy straw were 3.21, 1.82 and 11.42% respectively indicating that both the are similar with respect to the nutrients mentioned above. However, crude fibre of karad hay was higher (36.9%) than that of paddy straw (31.7%). Higher crude fibre observed in the present study might be due to the dry grass being harvested at the later stage. Increased crude fibre content has also been reported for other natural grass like Anjan hay (Chandra and Jayal 1966).

In vitro digestibility: Dry matter digestibility of karad hay in vitro was 43.02% minimum and maximum digestibility of 41.49% and 44.21% respectively. Paddy straw

Department of Animal Husbandry and Veterinary Services, Government of Goa, Daman and Diu.
corded a higher digestibility (48.95%) than karad hay. Increased crude fibre content could be the possible factor responsible for lower digestibility in karad.

In vivo digestibility Srivastava and Talapatra (1962) reported the A.I.A. technique as a simple method for the determination of digestibility. Thorney et al (1979) compared the digestibility estimation by total collection and A.I.A. methods and reported the reliability of A.I.A. as a suitable indicator. Therefore in the present study, to avoid the laborious total collection method, in vivo D. M. digestibility of hay was estimated by indicator method using acid insoluble ash as indicator. The mean D. M. digestibility estimated was 37.81 ± 19% with minimum and maximum digestibility of 35.62 ± 5.61 and 39.9 ± 5.54% respectively. There was no significant difference between animals on D. M. digestibility.

Studies conducted on the in vivo digestibility of the natural grass hay (Themada quadrilata) in comparison to the popular dry roughage paddy straw indicated that karad hay is more digestible (43.02%) than paddy straw (48.35%). In vivo digestibility of the hay estimated by indicator method also revealed the poor digestibility (37.81%) of karad. Higher fibre content could be the possible reason for the lower digestibility of karad hay.

References:
GROWTH PERFORMANCE OF EXOTIC MEAT RABBIT AND ITS CROSSES UNDER THE TROPICAL COASTAL CLIMATIC CONDITION

R. N. S. Sundaram and A. R. Bhattacharyya,
I.C.A.R. Research Complex for Goa, Old Goa-403 402

The available reports about the exotic meat rabbits (Parillo and Vasenina, 1981; and Rasmussen, 1986; C. S. W. R. I. 1986) indicate that their performance is in a temperate region than in a tropical region. Hence cross breeding was carried out to overcome climatic constraints if any. The present paper reports the active growth performance of exotic, local and their crosses in Goa which has a coastal climate.

Materials and Methods: Soviet Chinchilla (SC) and local (L) adult rabbits were reared under identical management conditions at the ICAR Research Complex, Goa, for the production of young ones. All the animals were provided 70 gm concentrate and 350 gm grass daily. Lactating does were given 120 gm concentrate and fodder ad libitum. Breeding was programmed to produce three groups of rabbits

1. Pure Exotic (SC x SC) 2. Crossbred (XB) (L x SC) and 3. Pure Local.

Breeding was done by bringing the female to the male. Altogether, 10 batches were produced in each group which were routinely followed up. Weaning was done on the day of kidding. Weaned animals were provided with concentrates and green grass as per the recommended level (Chokke, 1987). A total of 168 kits involving 70 SC, and 46 L were available to study the growth. Observations on litter size, litter weight and weekly weight gain up to the marketing age of 16th week were recorded. These were analysed as per the procedure described by Snedecor and Cochran (1967) and presented in the table.

Comparative growth performance of exotic, crossbred and local rabbits

<table>
<thead>
<tr>
<th></th>
<th>SC</th>
<th>XB</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight (kg)</td>
<td>7.00±1.24</td>
<td>5.20±1.03</td>
<td>4.6±0.90</td>
</tr>
<tr>
<td>Weaning weight (kg)</td>
<td>4.0±0.81</td>
<td>4.9±0.98</td>
<td>4.0±0.40</td>
</tr>
<tr>
<td>Birth weight (kg)</td>
<td>0.38±0.05</td>
<td>0.27±0.03</td>
<td>0.21±0.04</td>
</tr>
<tr>
<td>Weaning weight (kg)</td>
<td>2.10±0.44</td>
<td>1.73±0.45</td>
<td>1.77±0.28</td>
</tr>
<tr>
<td>At 16th week (kg)</td>
<td>2.00±0.25</td>
<td>1.73±0.18</td>
<td>1.50±0.12</td>
</tr>
<tr>
<td>Daily weight gain (g)</td>
<td>17.37</td>
<td>15.03</td>
<td>13.31</td>
</tr>
</tbody>
</table>

ICAR Research Complex for Goa / contribution No. 4
Performance of exotic meat rabbit

The findings are in conformity with the report about exotic rabbits from J.R.I. (1986). From the table it could be observed that there was no appreciable difference in litter size at weaning between SC and XB animals. However, litter weight gain and weight to kit at 16th week was higher in SC than in other groups, indicating its better growth rate. The average daily weight gain was also significantly higher (P<0.01) in Soviet Chinchilla. It was interesting to note that the daily weight gain in SC was 16 g during the 4th week and 18 g during 16th week as compared to the kits in which it was 19 g at the beginning and 9 g at 16th week and in case of XB it was 4 g at the beginning and 15 g at 16th week. Thus, it was apparent that in local SC the high growth rate was maintained only for a short period up to weaning; whereas in case of SC and XB the growth rate was maintained till the marketable age as earlier. Considering the growth rates of the three groups, it was clear that the rearing of the locals up to 16th week may not be profitable.

From the overall studies it was observed that under the tropical coastal climatic condition, the purebred SC performed better in comparison to XB. Thus, it can be inferred from the present work that there is no advantage in crossbreeding of meat Soviet Chinchilla rabbit with local and it would be beneficial to go in for pure breeding for better growth under the prevailing agroclimatic conditions.

Acknowledgement

The authors wish to thank Dr. K. Venugopal, former Joint Director of this Arch Complex for providing necessary facilities and keen interest in this work.

References

Intrak Sheep and Wool Research Institute, Avikanagar (1986) — Twenty five years of Research, pp. 70-73.


PERFORMANCE OF EXOTIC MEAT RABBIT UNDER TROPICAL COASTAL CLIMATIC CONDITION

R.N.S. Sundaram and A.R. Bhattacharyya
ICAR Research Complex (CPCRI), Ela, Old Goa-403402 India

ABSTRACT

Out of 4 meat type exotic breeds (Soviet Chinchilla, New Zealand White, Grey Giant and White Giant) of rabbit introduced under the coastal climatic condition (Goa), production performance of Soviet Chinchilla was better with highest kindling (78.5%), litter size (6) and average daily weight gain (19.17 gm). The result is indicative that the meat type rabbits, particularly, Soviet Chinchilla can be successfully reared for quality meat production.

Rabbit rearing for meat and wool has been gaining popularity in India during the recent years. Exotic meat breed was introduced in 1979, in sub Himalayan region. There is dearth of literature on the introduction and production performance of this species under coastal climatic condition. Goa is a coastal state, having annual rainfall of 300 cm, restricted to 4 months (June to Sept.), with moderate temperature (20°C to 30°C) and high humidity (75% to 92%). It offers good scope for meat producing livestock because of the unique non-vegetarian food habits of the Goans as well as demand due to heavy tourist inflow. The paper presents important informations for the possibilities of rearing meat rabbits in Goa.

Four exotic meat breeds of rabbit viz., Soviet Chinchilla, New Zealand White, Grey Giant and White Giant were introduced from Central Sheep and Wool Research Institute, Station (Division of Fur Animal Breeding, Garsa, Instt. Kulu, H.P.). These animals were maintained in individual cages under optimum managemental and hygienic condition. A concentrate feed mixture prepared with 35 parts wheat and 65 parts pelleted feed (TDN 65% and DCP 17%) was provided @ 65 gm/animal/day. Mixed green fodder containing rythrina, Subabul and NB 21 grass was fed @ 350 gms/animal/day. Drinking water was provided ad libidum. Breeding was done by bringing the female to the male. After successful mating, the female was separated and followed up. Various economic traits viz., kindling percent, litter size and litter weight were recorded for each kindling and data analysed.

Performance of the four exotic meat breeds (Table 1) indicate that the kindling (78.5%) and growth rate (19.2 gm) were higher in Soviet Chinchilla
Table I. Performance of Exotic meat breeds in Goa

<table>
<thead>
<tr>
<th>Breed</th>
<th>No. of Observations</th>
<th>Kindling percent</th>
<th>Litter size at birth</th>
<th>Weight at Birth (g)</th>
<th>Gestation period (days)</th>
<th>Av. daily weight gain (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soviet Chinchilla</td>
<td>28</td>
<td>78.50</td>
<td>6.00</td>
<td>59.48</td>
<td>32.0</td>
<td>19.2</td>
</tr>
<tr>
<td>New Zealand White</td>
<td>17</td>
<td>41.20</td>
<td>6.7</td>
<td>64.0</td>
<td>31.3</td>
<td>14.1</td>
</tr>
<tr>
<td>White Giant</td>
<td>16</td>
<td>50.00</td>
<td>5.3</td>
<td>69.2</td>
<td>31.6</td>
<td>15.0</td>
</tr>
<tr>
<td>Grey Giant</td>
<td>11</td>
<td>54.54</td>
<td>5.0</td>
<td>61.3</td>
<td>32.3</td>
<td>14.2</td>
</tr>
</tbody>
</table>

Though litter size was higher in New Zealand White (6.7). The overall performance of Soviet Chinchilla was found better than other breeds under local conditions. However, comparative performance of these breeds under sub-Himalayan region (Garsa) was superior for White Giant than the others (Singh and Kishore 1984).

In view of the better performance of Soviet Chinchilla, further observations were made on this breed. The result is presented in Table 2.

Table II. Performance of Soviet Chinchilla rabbit in Goa

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation period (days)</td>
<td>32.3±0.82</td>
</tr>
<tr>
<td>Litter size at birth</td>
<td>6.0±2.40</td>
</tr>
<tr>
<td>Litter size at weaning (28 days)</td>
<td>4.4±1.50</td>
</tr>
<tr>
<td>Litter weight at weaning (kg)</td>
<td>1.95±0.37</td>
</tr>
<tr>
<td>Birth weight (g)</td>
<td>59.5±13.77</td>
</tr>
<tr>
<td>Weight at 16th week (kg)</td>
<td>2.1±0.36</td>
</tr>
<tr>
<td>Adult weight (kg) 1 year</td>
<td>Male 3.7±0.62</td>
</tr>
<tr>
<td></td>
<td>Female 3.6±0.72</td>
</tr>
<tr>
<td>Average daily weight gain up to 16 weeks (g)</td>
<td>19.17±3.23</td>
</tr>
</tbody>
</table>

The performance of Soviet Chinchilla was satisfactory and comparable to their performance at the Himalayan region, which is indicative of that the meat type rabbits particularly Soviet Chinchilla can be successfully reared under coastal climatic condition.

The authors are thankful to Dr. M.K. Nair, Director, Central Plantation Crops Research Institute, Kasaragod and Dr. K. Venugopal, Ex-Joint Director of this Research Complex for their keen interest and providing facilities for the work.

REFERENCES

VOLUNTARY FEED INTAKE AND NUTRIENT DIGESTIBILITY OF EXOTIC MEAT RABBIT UNDER TROPICAL COASTAL CLIMATE

R.N.S. Sundaram, E.B. Chakurkar and A.R. Bhattacharyya

ICAR Research Complex, Old Goa - 403 402

Information on voluntary feed intake of a meat rabbit under tropical coastal climatic condition is lacking. In view of this, a descriptive feeding trial was conducted on exotic meat breed of rabbits under practical management condition, to find out daily feed requirement. Eight each of Soviet chinchilla and New Zealand white of 45 days age were selected for the trial. Individual animals were weighed and ad libitum with green grass and concentrate feed and maintained under identical management condition.

The feed intake, leftover and dung output were recorded daily for individual animals for one week after the preliminary trial of three weeks. Dry matter intake and digestibility were calculated based on the data collected during the feeding trial. Comparative performance of the breeds is presented in the table.

The average daily weight gain and feed intake per day were almost at par for both breeds. The digestibility of ADF was 40.02 and 40.03, whereas that of CP was 62.06 and 65.66 for SC and NW breeds, respectively. Evans et al. (1983) reported the DM intake of

Comparative performance of exotic meat rabbits on DM intake and nutrient digestibility

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Soviet Chinchilla</th>
<th>New Zealand White</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMI (g/day)</td>
<td>88.12 + 6.15</td>
<td>81.99 + 3.02</td>
</tr>
<tr>
<td>digested (g/day)</td>
<td>51.88 + 3.17</td>
<td>49.65 + 1.65</td>
</tr>
<tr>
<td>digestibility (%)</td>
<td>58.87 + 2.14</td>
<td>60.55 + 1.76</td>
</tr>
<tr>
<td>intake/kg body wt (%)</td>
<td>9.27 + 0.54</td>
<td>9.24 + 0.61</td>
</tr>
<tr>
<td>digested (%)</td>
<td>40.02 + 2.04</td>
<td>40.03 + 1.13</td>
</tr>
<tr>
<td>gested (%)</td>
<td>62.06 + 2.81</td>
<td>65.66 + 1.96</td>
</tr>
<tr>
<td>ge body weight (g)</td>
<td>950.00</td>
<td>887.00</td>
</tr>
<tr>
<td>ge daily weight gain (g)</td>
<td>24.60</td>
<td>24.38</td>
</tr>
</tbody>
</table>
per cent per kg body weight for
bits. The average intake of DM in
it study was 9.27 and 9.24 for SC
rabbits, respectively. The DM
y was 58.87 and 60.55 for these
imilar values have been reported by
and Grandi (1984) for young NW
th mixed feed. The present study
hat the DM requirement is around
t of the body weigh for weaners,
irrespective of the breed under tropical coastal
climatic conditions.

References:


Evans, E., Jebelian, V. and Rycquart, W.C. (1983) ... 
Ibid., 6:6.

For the Attention of Retirees

News about the retirements of members of veterinary profession with their
al addresses are welcome for publication at a nominal charge of Rs.100/-

Editor