CHAPTER - V

GROWTH RESPONSE OF CHICKS FED WITH RICE GERM
AS A FEED ADDITIVE
The rate of growth of chicks in India is known to be poor compared to what is reported from Western Countries. This undergrowth is often attributed to nutritional inadequacies of the chick rations. In fact a detailed knowledge of the nutritive values of locally available feed stuffs is lacking. Moreover, no standards are recognised for these feed stuffs like rice polish, groundnut cake, etc. Rice polish, the major ingredient, in chick mash varies very much in quality. In a feed trial conducted by Ghousuddin and Talapatra (1969), mortality of chicks was very high (least being 34 per cent in 16 weeks) and the authors attributed the high mortality to rice polish which figured from 40 to 70 per cent in the mash fed to chicks. They suspected the poor growth and high mortality of chicks to the high percentage of unsaturated fatty acids present in the rice polish which rendered the vitamin E of the rice polish unavailable to the chicks. It is a recognised fact rice germ ordinarily is an ingredient of rice polish and that it contains vitamin E in sufficient amounts to promote growth. In our estimates of the germ of the Ginsali variety of rice, we obtained 0.56 mg. of it in 100 mg. of germ lipid when determined without saponification.
and 0.22 mg. per 100 mg. of lipid when tested after saponification. We suspect that the rice polish used by Ghousuddin and Talapatra in their feeding trials might have been deficient in sufficient amounts of rice germ, as they did not make any report about it. Our suspicions are further strengthened by the fact that in modern milling practice, most of the germ is assorted with the broken bits of rice and very little finds its way into the rice polish. In order to test the validity of our reasoning, we thought of conducting some feeding trials with rice germ as an additive in the mash. As far as we are aware no such feeding trials have so far been conducted in India. The feeding trials reported here were so designed as to test the efficacy of rice germ as a feed additive and to see if it has necessarily to be added and if so to what extent.

MATERIAL AND METHOD

The cheapest gruel stuff offered in the local market consists of about 80 per cent rice germ and 20 per cent broken bits of rice. During the height of the milling season the most popular variety, the Ginnsali is being milled and our feeding trials were conducted by using the
gem of that variety of rice. The Ginsali is a large variety of paddy and is easily distinguished from others. Its gers are also large. For our feeding trials gers were retrieved from the gruel rice and used. The pro- portion of the ingredients used in the various mashers are given in the tables.

One week-old chicks were used in these trials to avoid errors often incidental to early juvenile mortality. The chicks used were of our new breed deve- loped in the Karnatak University. Sixty healthy chicks were sorted out into 4 batches of 15 each. The initial weight of chicks varied from 57 to 59 grams and they were sorted out in such a way that the average weight in each batch was either 58.1 or 58.2 grams. They were reared for a period of six weeks in wooden wire-meshed cages
(50" x 50" x 30"), with wooden flooring with rice husk.

**Feeding Trials:**

The general composition of the mashers used in the present study is shown in the table 1. The basal mash fed to the control chicks was made up of Hind lever chick concentrate (35%) rice polish (45%) maize (15%) and wheat coarse middlings (5%). Each 100 g. ration
<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Crude protein value</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chick concentrate</td>
<td>32.0</td>
<td>35.0</td>
<td>30.8</td>
<td>26.20</td>
<td>14.00</td>
</tr>
<tr>
<td>Maize</td>
<td>9.0</td>
<td>15.0</td>
<td>13.2</td>
<td>12.00</td>
<td>6.00</td>
</tr>
<tr>
<td>Rice polish</td>
<td>12.0</td>
<td>45.0</td>
<td>39.6</td>
<td>33.00</td>
<td>18.00</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>15.0</td>
<td>5.0</td>
<td>4.4</td>
<td>3.75</td>
<td>2.00</td>
</tr>
<tr>
<td>Rice germ</td>
<td>22.6</td>
<td>--</td>
<td>12.0</td>
<td>25.00</td>
<td>60.00</td>
</tr>
</tbody>
</table>

% Crude protein value of different mash under trial (calculated value)

- Chick concentrate: 18.6
- Maize: 19.0
- Rice polish: 18.35
- Wheat bran: 20.7

Metabolisable energy value (Kcal/Kg. of mash)

- Chick concentrate: 1472.0
- Maize: 1472.5
- Rice polish: 1472.9
- Wheat bran: 1472.22
EFFECT OF RICEGERM AS A FEED ADDITIVE ON THE GROWTH OF CHICKS

WEIGHTS IN GMS

WEEKS
Table 2: Effect of rice germ as a feed additive on the growth of chick

<table>
<thead>
<tr>
<th>Condition of the experiment</th>
<th>Initial weight</th>
<th>1st week</th>
<th>1st week</th>
<th>2nd week</th>
<th>3rd week</th>
<th>4th week</th>
<th>5th week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basal diet</td>
<td>58.1</td>
<td>66.5 ± 4.9</td>
<td>99.0 ± 8.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>88% Basal diet + 12% rice germ</td>
<td>58.1</td>
<td>73.5 ± 3.9</td>
<td>103.5 ± 5.4</td>
<td>(+)</td>
<td>(**)</td>
<td>(+)</td>
<td>(+)</td>
</tr>
<tr>
<td>75% Basal diet + 25% rice germ</td>
<td>58.2</td>
<td>64.34 ± 5.5</td>
<td>91.0 ± 7.8</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
</tr>
<tr>
<td>40% Basal diet + 60% rice germ</td>
<td>58.1</td>
<td>62.0 ± 5.0</td>
<td>86.0 ± 5.0</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
</tr>
</tbody>
</table>

(+): not significant
(*): significant \( P < 0.05 \)
(**): highly significant \( P < 0.01 \)
included 30 mg. of Vita blend (vitamin mixture of Alkali and chemical corporation, Madras). Mash II contained 12% rice germ. In mash III the per cent of the rice germ was increased to 23%. And the mash IV contained 60% rice germ. All the mashes were well fortified with minerals and vitamins. The protein level of the diet was maintained at 18 to 20%. Feed and water were supplied ad libitum. The metabolizable energy value (ME) of the different mashes were calculated following the formula given by Sibbald et al (1963). The calculated ME value was almost the same for all mashes. (Table). Weights of the individual chicks were determined weekly. The results of all experiments were subjected to analyses of variance and significant differences if any were determined according to Fisher and Yates (1949).

RESULTS

The effect of feeding rice germ to growing chicks is shown in the table 2. It is discernable from the figure ( ) that the linear graded growth response was noticed in those chicks fed with mash II, containing 12% of rice germ. On the other hand the chicks fed with mash III, containing 25% of rice germ revealed decrease
in their body weight, and the effect was still severe with mash IV, containing 60% rice germ in their basal diet.

**DISCUSSION**

Grains are usually regarded as sources for energy in animal feed and they supply incidentally one-third to two-thirds of the dietary protein requirements of chicks and layers respectively (Carpenter and Clegg, 1957; Davidson et al. 1962). Significantly improved growth of chicks by the addition of corn to the basal diet or by raising the protein levels of basal diets from 22 per cent to 30-34 per cent with addition of fish meal, has been observed by Schumaier and McGinnis (1969). A similar growth response to high levels of proteins added to purified diets had been observed by Scott et al. (1957). These results certainly indicate that the protein level should be high to obtain a better growth of chicks.

The present feeding experiment was so devised as to test primarily the suitability of the rice germ as a feed additive. Incidentally it was meant to test its efficacy to preserve life, though growth rate may be subnormal; this was presumed on account of the high level
of vitamin E present in the rice germ. The growth rate was good when 12 per cent of rice germ was added. But when 25 per cent was added, growth rate was poor. When 60 per cent was added, growth was very much depressed. However, we did not have the mortality which Ghousuddin and Talapatra encountered with high levels of rice polish. This we attribute to the presence of vitamin E which might have been absent in the rice polish used by them.

There remains one fundamental question to be answered. Why growth was depressed when 25 and 60 per cent rice germ was added to the diet though the protein level was good enough? The one possible answer is the presence of high level of sterol present in the rice germ oil (2.9 per cent, Chapter IV). Viviani et al (1959) observed that the addition of more than 10 per cent of rice germ to the basal diet decreased the level of cholesterol in the liver of rats. Siperstein and Guest (1960) obtained complete inhibition of cholesterol synthesis in the rat liver when fed with a diet containing 0.5 per cent cholesterol. A similar feedback mechanism of cholesterol synthesis in the chicken liver has been demonstrated by Sukakidu (1963). It may be mentioned in this connection that the earlier impression was that stigmasterol, the
plante cholesterol is not absorbed in the gut of animals (Deuel, 1951). However, further research is required to elucidate whether plant sterol present in the feed will inhibit liver cholesterol synthesis in the chicken and whether that will depress growth.

**SUMMARY**

1. The protein level of the feeds showed very little variation. Yet chicks fed with 12 per cent rice germ showed better growth than others. Those chicks fed with 25 per cent rice germ in the diet fared badly compared to the controls fed with basal diet. Those fed with 60 per cent rice germ fared much worse than others, though no deaths occurred.

2. It is surmised from these results that rice germ in small quantities is beneficial, since it contains fat and proteins as well as vitamin E; absence of deaths even in the case of very poor growth may be attributed to the beneficial effects of vitamin E. However, it is presumed that the large amount of cholesterol (2.9 per cent) found in the rice germ may have affected metabolism
adversely and brought about the depression in growth in those experimental birds fed with 25 per cent and 60 per cent rice germ. Further research is essential to test the validity of this assumption.