Effect of Cecal Ligation on Digestibility of Crude Fiber, Cellulose and Pentosan in Chickens

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It has been asserted that a majority\(^1\) or a significant portion\(^2,3,4\) of crude fiber eaten by chickens is digested in the ceca. More recently, NAKAHIRO \textit{et al.}\(^5\) demonstrated with chicks fed a semi-purified diet containing 12.5\% fibrous screenings of Italian ryegrass that the digestibility of crude fiber, cellulose and pentosan was not affected by cecum ligation, and concluded that the cecum does not play an important role in the digestion of crude fiber in chickens.

In order to verify the above-mentioned conclusion, the digestibility of crude fiber, cellulose and pentosan was measured in both cecum ligated and non-ligated chickens fed various kinds of diets.

Experimental procedure

Ten-month-old single comb White Leghorn cockerels, the ceca on both sides of which were either ligated or non-ligated, were used in this experiment. The method of cecum ligation has been described by NAKAHIRO \textit{et al.}\(^5\). The non-ligated birds were sham-operated as the control. The experiment was conducted one month after the operation. The chickens were fed experimental diets and water \textit{ad libitum} for 6 days. Feces were collected for the final 3 days of each feeding period. Crude fiber, cellulose and pentosan in the diets and feces were analyzed by the method described by NAKAHIRO \textit{et al.}\(^5\).

The experimental diets used here were comprised as follows: Corn or Wheat Diet—corn or wheat 98.8\%, sodium chloride 0.4\%, mineral mixture\(^6\) 0.05\%, vitamin mixture\(^5\) 0.25\%, chromic oxide 0.5\%; Copra Meal Diet (pelleted)—copra meal 20.0\%, corn starch 62.7\%, corn oil 5.0\%, milk casein 5.0\%, mineral mixture\(^7\) 5.6\%, vitamin mixture\(^7\) 1.2\%, chromic oxide 0.5\%; Grass Fiber Diet (pelleted)—grass fiber from orchard grass 12.5\%, corn starch 63.2\%, corn oil 5.0\%, milk casein 12.0\%, mineral mixture\(^7\) 5.6\%, vitamin mixture\(^7\) 1.2\%, chromic oxide 0.5\%.

Results and Discussion

Digestibilities of crude fiber, cellulose and pentosan in the experimental diets are shown in Table 1, it can be seen that the cecum ligation caused no significant effect in the digestibilities of crude fiber, cellulose and pentosan. According to RADEFF\(^2\) and

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\(^1\) Studies on the function of ceca of chickens. Report 7.
\(^2\) Received February 17, 1975.
Henning3), the digestibility of crude fiber was 17.1% and 19.7%, respectively, by normal chickens fed a corn diet, while, in cecum-removed chickens the digestibility of crude fiber fell down to almost 0%. Thornburn and Willcox4) also reported that the crude fiber digestibility of barley, wheat and oats was slightly lowered by the removal of ceca in chickens, and that the crude-fiber digestibility varied with the food being eaten and with its crude fiber content. Naka Hiro et al.5) reported that the digestibility of crude fiber, cellulose and pentosan was not changed by ligation of the ceca in chickens. The present experiment proves that the chicken cecum does not play a significant role in the digestion of crude fiber.

As shown in Table 1, cecum ligation did not influence the digestion of cellulose and pentosan. This show that, except for the corn-diet feeding, the digestibility of pentosan was higher than that of cellulose. Thornburn and Willcox4) also reported that pentosan digestibility is not affected by cecectomy, but cellulose digestion varied from one bird to another. The high digestibility of crude fiber in copra meal may be due to the high concentration of pentosan in crude fiber of copra meal.

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Literature

鶏盲腸の結紮が粗繊維、セルロースおよびペントザンの消化率に及ぼす影響

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鶏盲腸における粗繊維消化機能の有無を知るために、盲腸を結紮した鶏に対し、もうろこし、小麦、コブラミールおよびオーチャードグリス繊維、それぞれ繊維源とする粗製飼料を飼育して粗繊維、セルロースおよびペントザンの各消化率を測定した結果、対照鶏（抜皮手術鶏）による消化率との間に有意差は認められなかった。

以上の結果より、鶏の盲腸では粗繊維消化機能はほとんどないと考えられる。（家禽会誌、12, 138~140, 1975）

（鶏の盲腸機能に関する研究（7））