

Anthelmintic Effect of Destomycin A against Poultry Tapeworms

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Introduction

Destomycin A is a new anthelmintic antibiotic produced in a culture broth of *Streptomyces rimofaciens*. Previously in 1968, the author reported the effectiveness of this antibiotic against *Ascaridia galli* and *Capillaria obsignata* in fowls when administered as a feed additive for a long time. The internal parasites of fowls include caecal worms and tapeworms in addition to ascarid worms and capillaria worms. All of them give serious injuries to fowls. In this report the result of the experiments on the anthelmintic effect of destomycin A on tapeworms are described.

Materials and Methods

Ten fowls naturally infected with tapeworms were purchased on April 28, 1969. During the four days from April 29 to May 2, the whole discharged segments in feces were examined and the species of tapeworms were decided by observing the shapes of the discharged segments and onchospheres. On May, ten fowls were equally divided into two groups, A and B. The fowls of group A were fed with a diet containing 10 g. of destomycin A per ton of feed, whereas those of group B were fed with that containing 5 g. of the antibiotic. Each group received its respective diet for ten weeks from May 5 to July 12. During this period, the whole discharged segments within a day were counted every seventh day, and from their reduction in numbers, the effectiveness of destomycin A against tapeworms was evaluated. For one week from July 13 to 19,

basal diet without destomycin A was fed to both groups, and on July 20, all fowls were killed and examined for surviving worms.

Results

The species of tapeworms infecting ten fowls and the number of excreted segment lumps examined during four days from April 29 to May 2, are shown in Table 1. The average number of excreted segment lumps per fowl by each group are shown in Table 2. The numbers of excreted segment lumps by each fowl of both groups, as counted weekly after the start of destomycin A administration, are shown in Table 3 and Table 4. With group A which was fed with the diet of 10 g. per ton, two fowls out of five stopped excretion after one week of medication and the other three were still excreting from two to ten segment lumps daily. After two weeks, only fowl No. 5 was excreting segments. This fowl excreted only one segment lump on the third week and the excretion stopped after that. With group B which was fed with the diet of 5 g. per ton, four fowls out of five stopped excretion after one week. Fowl No. 10 continued to excrete one segment lump daily even after two weeks and stopped excretion after three weeks. One week after the stoppage of medication autopsies were performed, and all birds were examined for surviving worms but none could be detected.

Discussion

It rarely occurs that fowls in one poultry house are infected by only one species of tapeworm. Usually two to three species are

Table 1 Species of infecting tapeworms and number of segment lumps excreted in a day.

No. of hens	Species of infecting tapeworms	*Number of segment lumps excreted			
		Apr. 29	Apr. 30	May 1	May 2
1	<i>R. echinobothrida</i>	10	9	10	13
2	<i>R. echinobothrida</i>	8	7	10	11
3	<i>R. kashiwarensis</i>	30	26	42	27
4	<i>R. kashiwarensis</i>	12	10	14	20
5	<i>R. kashiwarensis</i>	8	12	19	6
6	<i>R. cesticillus</i>	14	26	27	16
7	<i>R. echinobothrida</i>	10	8	7	7
8	<i>R. kashiwarensis</i>	10	9	8	6
9	<i>R. echinobothrida</i>	5	10	6	5
10	<i>R. kashiwarensis</i>	7	11	18	16

* Numbers in the above table indicate the number of segment lumps excreted in a day, and not the total number of segments. The number of segments contained in a lump vary with the species of tapeworm. Thus with *R. cesticillus*, a lump contains 3-4 segments and with *R. kashiwarensis* a lump contains 4-5 segments, while with *R. echinobothrida*, the segments are excreted individually. Consequently, to have the actual number of segments excreted in a day, the number in the table must be multiplied by a factor of 3-4 in the case of *R. cesticillus* and by 4-5 in the case of *R. kashiwarensis*.

Table 2 Average numbers of excreted segment lumps per fowl in group A and B before medication.

	Apr. 29	Apr. 30	May 1	May 2
Group A	14	13	19	15
Group B	9	13	13	10

Table 3 Changes of the numbers of excreted segment lumps on medication in group A.

No. of hens	Duration of medication in weeks									
	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0	0	0	0
4	6	0	0	0	0	0	0	0	0	0
5	10	15	1	0	0	0	0	0	0	0

found infecting. In this study on the effect of destomycin A on tapeworms, the author has chosen three species of tapeworms, namely *Raillietina echinobothrida* and *Rail-*

Table 4 Changes of the numbers of excreted segment lumps on medication in group B.

No. of hens	Duration of medication in weeks									
	1	2	3	4	5	6	7	8	9	10
6	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0
10	6	1	0	0	0	0	0	0	0	0

lietina cesticillus, most common in Japan, and *Raillietina kashiwarensis* which is mainly distributed in the Kinki district of Japan. With group A which was fed with the diet containing 10 g. of destomycin A per ton of feed, two fowls stopped the excretion of segments after one week, and four were devoid of segments by the end of the second week. Only one was still excreting one lump of segment a day at the end of the third week, and thereafter all five were free from segments in feces. With group B, which

was fed with the diet containing 5 g. of destomycin A per ton of feed, four fowls stopped excretion even after two weeks. No segment was excreted by any fowl after three weeks. The above results show that feeding with the diet, which contains 5 to 10 g. of destomycin A per ton of feed, is effective for suppressing the growth of *R. echinobothrida*, *R. cesticillus* and *R. kashiwarensis*, thus inhibiting the formation of mature segments after 2 to 3 weeks of medication.

On examining the effectiveness of destomycin A against three species of tapeworms on account of decrease in the number of excreted segments, it is found that the species which continued to excrete segments even after one week was *R. kashiwarensis*, whereas *R. echinobothrida* and *R. cesticillus* stopped excretion at the end of the first week. From these observations it is clear that destomycin A is less active against *R. kashiwarensis* than *R. cesticillus*. More experiments are, however, required for the fowls infected with *R. kashiwarensis*.

A comparison between the two groups, with regard to the reduction in the numbers of excreted segments indicate that there is no distinct difference in efficacy between the two levels of 10 g. per ton and 5 g. per ton, though destomycin A was some less effective with one bird infected with *R. kashiwarensis* belonging to the group of 10 g. per ton of feed level.

All fowls were killed and examined for surviving worms in the small intestines after having been only the basal diet for one week following the cease of destomycin A administration, expecting growth of surviving worms after the cessation of medication to a visible size during this period. However, none was found at necropsy. The above facts indicate that continuous administration of destomycin A to the extent of 5 to 10 g. per ton for a duration of about two months is effective in inhibiting the growth of tapeworms within 2 to 3 weeks, thus eliminating them completely at the end.

Summary

Ten fowls naturally infected with *Railletina echinobothrida*, *R. cesticillus* and *R. kashiwarensis* were divided into two groups of five fowls each. Group A received the ration containing 10 g. of destomycin A per ton of feed, and group B to an extent of 5 g. per ton. Both groups were fed with the rations for two months. During this period, reduction in the number of discharged segments excreted in feces was examined, and the efficacy of destomycin A against these tapeworms was evaluated.

(1) With group A, two fowls stopped excreting segments after one week, and four were devoid of segments by the end of the second week. Only one was still excreting one lump of segment a day at the end of the third week, and thereafter all five were free from segments in feces. With group B, four fowls stopped excreting segments after one week, and all five were free from segments in feces after three weeks.

(2) Segments of *R. echinobothrida* and *R. cesticillus* disappeared after one week and those of *R. kashiwarensis* after 3 to 4 weeks.

(3) One week after the cease of destomycin A medication, all fowls of both groups were killed and examined for the surviving worms in small intestines, and were found to be completely absent from worms.

(4) By the continuous administration A in feed in the concentration of 5 to 10 g. per ton for a long time, growth of *R. echinobothrida* and *R. cesticillus* is inhibited within a week and that of *R. kashiwarensis* within 3 to 4 weeks, resulting in the cessation of excreting mature segments in feces. All worms can be completely eliminated within two months.

References

- Sawada, I. (1968): Anthelmintic effect of destomycin A against internal parasites of poultry. *Animal Husbandry*, 22, 845-846. (in Japanese)

鶏糸虫に対するデストマイシン A の駆虫効力

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デストマイシンAは放線菌の一種である *Streptomyces rimofaciens* から分離された駆虫性新抗生物質です。すでに著者(1968)によつて鶏の回虫および毛体虫の駆虫にすぐれた効力のあることが明らかにされている。今回は鶏糸虫に対してデストマイシンAが如何なる駆虫効力を有するかを試験した。その結果、飼料1トンあたり

5g~10gのデストマイシンAを添加したものを長期間にわたつて投与すると、棘溝糸虫および有輪糸虫では1週間後に、樞原糸虫では3~4週間後にそれぞれ老熟片節の離脱が認められなくなり、2カ月以内には虫体が完全に駆虫されてしまうことが判明した。