Forum Pascasarjana (1990) 13 (2): 29-44.

EFFICACY EVALUATION OF SOME COCCIDIOSTATS AS CHICKENS COCCIDIOSIS CONTROL AGAINST LOCAL STRAIN IN INDONESIA[1]

(Pengkajian efektivitas beberapa koksidiostat sebagai pencegah koksidiosis pada ayam yang disebabkan oleh coccidia galur lokal di Indonesia)

Gatut Ashadi[2]

ABSTRAK

Seribu delapan ratus ekor anak ayam umur sehari Starbro-broiler digunakan dalam tiga penelitian ini, 450 ekor untuk penelitian BAYCOX, 450 ekor untuk penelitian CYGRO dan 900 ekor untuk penelitian CLINACOX. Ketiga penelitian ini bertujuan untuk mengkaji efektivitas koksidiostat-koksidiostat itu dengan parameter internasional yang digunakan oleh Reid (1970) yaitu mortalitas, skor pelukaan, pertambahan berat badan rata-rata dan konversi makanan.

Hasil penelitian menunjukkan bahwa pada kelompok anak ayam yang tidak ditambahkan koksidiostat dalam makanan atau air minumnya terjadi kematian antara 19%-76% setelah ditantang, sedangkan pada kelompok anak ayam yang mendapatkan tambahan koksidiostat dalam makanan atau air minumnya tidak terjadi kematian setelah ditantang. Pertambahan berat badan pada kelompok anak ayam yang tidak menerima tambahan koksidiostat lebih kecil dari ayam kontrol, sedangkan pada anak ayam yang menerima tambahan koksidiostat tampak sama atau sedikit lebih dari ayam kontrol setelah ditantang. Pada kelompok anak ayam yang mendapat tambahan koksidiostat skor pelukaan menunjukkan tidak terjadinya koksidiasis atau koksidiosis, sedangkan pada kelompok anak ayam yang tidak mendapat tambahan koksidiostat menunjukkan terjadinya koksidiosis atau koksidiasis setelah ditantang. Konversi makanan pada anak ayam yang tidak mendapatkan tambahan koksidiostat menunjukkan efektifitas mengubah makanan lebih kecil dari ayam kontrol, sedangkan pada kelompok anak ayam yang mendapatkan koksidiostat konversi makanan kurang lebih sama dengan ayam kontrol setelah ditantang.

INTRODUCTION

Coccidiosis is a parasitic disease caused by unicelluler animals belonging to the phylum Protozoa. The disease is one of many kinds causing problem and loss to chicken farms. The loss caused by it comprises mortalities, decrease of body weight, delay of egg production and low egg production, decrease of feed conversion and increase of medical cost, labour cost, etc. Since the loss can prevent or even discourage the development of chickens farms, which consequently

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[1] Pengkajian terhadap koksidiostat BAYCOX dari PT. Bayer Indonesia, CYGRO dari American Cyanamid Company dan CLINACOX dari PT. Squibb Indonesia.

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also inhibit the government's effort to increase animal protein production, it is desirable to endeavour control measures against coccidiosis in chickens.

There are two forms of coccidiosis in chickens: Caecal coccidiosis caused by ***Eimeria tenella*** and intestinal coccidiosis caused by. E. ***necatrix, E. maxima, E. brunetti, E. acervulina, E. praecox, E. mitis*** and ***E. mivati.*** Beside that ***E. tenella*** can extends the zone of infection to caudal part of intestine, rectum, and according to Anderson ***et al.*** (1976) could infect the bursa of Fabricii. Single species infection was very seldom in the chickens farms, usually mixed infection occured. In Indonesia five species of coccidia had been isolated since 1967 by Prastowo, Ashadi and Soekardono namely: ***E. tenella,*** E. ***necatrix, E. maxima, E. acervulina*** and ***E. mitis.*** Ashadi (1979) determined accurately the local strains of ***Eimeria tenella,*** while Cahyaningsih (1986) studied carefully about pathogenicity of ***Eimeria acervulina.***

Up to the present, coccidiosis control in chickens in Indonesia is generally done by applying sanitation measures or by adding coccidiostat to the feed or drink of the chickens, while administration of imported coccidia vaccine has been tried only on several chickens farm industries. The tiny size of oocyst that enables it to be carried away by wind, dust, water, feed, drink, farm tools, labourers or people coming and leaving the farm, makes the hygienic method rather inefficient. On the other hand coccidiosis control by adding coccidiostat in the feed or drink requires careful handling and accurate doses so as not to cause side effects. Therefore all kinds coccidiostat that imported to Indonesia requires careful efficacy evaluation before distributed to the chickens farms.

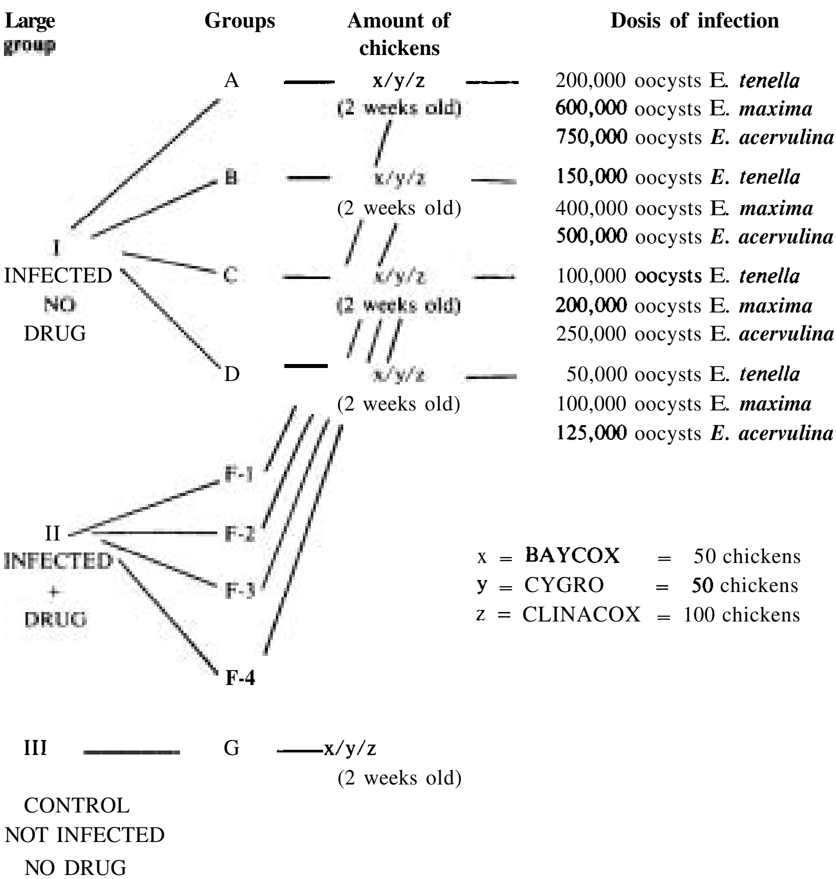
In this experiment Laboratory of Protozoology, Department of Parasitology and Pathology, Faculty of Veterinary Medicine, Bogor Agricultural University evaluated BAYCOX, CYGRO and CLINACOX coccidiostat as anticoccidial drugs against local strains of chickens coccidia. The species that will be used in this experiment are E. ***tenella,*** E. ***maxima*** and ***E. acervulina. E. tenella*** is the most pathogenic caecal coccidiosis, while ***E. maxima*** and ***E. acervulina*** is not so pathogenic but economically disturbance. According to Reid (1970) the excellent parameters used for efficacy judgment are mortality, lesion scores, average weight gains and feed conversion.

METHODOLOGY

Each coccidiostat has three large groups of two-weeks old chickens which free coccidial infection were used in this experiment, which comprises Large group I consist of four groups. Each of the group (A, B, C, D) composed of 50 chickens for Baycox and Cygro but 100 chickens for Clinacox. In the group A each chicken was infected with 200,000 oocysts of E. ***tenella.*** 600,000 oocysts of ***E. maxima*** and 750,000 oocysts of ***E. acervulina.*** In the group B each chicken was infected with 150,000 oocysts of E. ***tenella,*** 400,000 oocysts of E. ***maxima*** and 500,000 oocysts of ***E. acervulina.*** In the group C each chicken was infected with 100,000 oocysts of E. *tenella,* **200,000** oocysts of E. *maxima* and **250,000** oocysts of E. *acervulina.* In the group D each chicken was infected with **50,000** oocysts of E. *tenella,* **100,000** oocysts of E. *maxima* and **125,000** oocysts of E. *acervulina.* No drug given to the chickens in the large group I. The large group **II** composed of same four groups F-1, F-2, F-3 and F-4, which were infected with occysts E. *tenella,* E. *maxima* and *E. acervulina* same doses like group A, B, C, and D. Anti coccidial drugs **BAYCOX** was given 24 hours after infected through the drinking water with the dose 50 ppm during two days, CYGRO was given 48 hours before infected with the dose 5 ppm in the chickens feed continously until the end of the experiment, and CLINACOX was given with the dose 0.83 ppm in the feed since one-day old continously until the end of the experiment. The large group **III** is the control. Chickens in this group were not infected at all and also no drug were given.

The parameter used for efficacy judgment in this experiment were mortality, lesion scores, average weight gains and feed conversion. The experiment conducted until 8 weeks for **BAYCOX,** 7 weeks for CYGRO and CLINACOX.

The schematic design of the experiment as follows.



Chickens and Cages

Before the experiment started, single-cell isolation and oocysts reproduction were done and the chickens used in these experiments were Starbro-broiler. Special cages completed with feed and water cups were used during three weeks (one-day old until 21-days old). Each cage contain three chickens. After three weeks the chickens transfered to the floor-pen experiment rooms until 7 or 8 weeks old. On one-day old and every week the chickens were weighted.

Chickens Feed and Water Consumption

The feed which given to the chickens from one-day old until four-weeks old was Broiler Starter (BS = BRI).

The composition of the feed :

Maximum Water	:	14.0%
Maximum Gross protein	:	21.0%
Maximum Gross Fat	:	3.0%
Maximum Gross Fiber	:	4.0%
Maximum Ashes	:	5.5%

Broiler Finisher (BF = BR2-1) were given to the four-week old chickens until the end of the experiment, which had composition :

Maximum Water	:	14.0%
Maximum Gross protein	:	19.0%
Maximum Gross Fat	:	4.0%
Maximum Gross Fiber	:	4.0%
Maximum Ashes	:	5.0%

Feed and water were given ***et libitum*** and the consumption every day always were noted.

Oocysts of Coccidia

A virulent local strain of E. ***tenella,*** moderate pathogenis of E. ***maxima*** and slight pathogenic of E. ***acervulina,*** which isolated since 1968 from Jakarta, **Bogor, Bandung,** Semarang, Purwokerto, Yogyakarta, Surabaya, Malang and Banyuwangi were used for inoculation in these experiments. Pure strains was acquired by single-cell isolation technique, in the three successive passages. The oocysts obtained were used for reproduction of oocysts and the oocyst obtained were then used as inoculum.

Lesion Scoring Techniques

Seventh day after inoculation of the three species coccidia: E. ***tenella,*** E. ***maxima*** and ***E. acervulina,*** five chickens of BAYCOX and CYGRO experiments, ten chickens of **CLINACOX** experiments in the group (A, B, **C,** D, **F-1, F-2, F-3, F-4** and **G**) were dissected and the lesion score evaluation according to Johnson and Reid **(1970)** were assessed.

RESULT AND DISCUSSION

Mortality

The mortality (%) which occur in the **BAYCOX, CYGRO** and **CLINACOX** experiments were tabulated in the Table 1 indicated that there were no chickens died in the groups which received those drugs within the feed or the drinking water after challenged same as the control group. While in the group which didn't receive any drugs the mortality occur between **19%-76%** after challenged.

Table 1. **The mortality (%) occur in the** BAYCOX, CYGRO **and** CLINACOX **experiments.**
Tabel 1. Persentase mortalitas pada penelitian BAYCOX, CYGRO **dan** CLINACOX.

Experiments Penelitian	Large group Kelompok besar	Groups Kelompok								
		A	B	C	D	F-1	F-2	F-3	F-4	G
BAYCOX	I	70	46	42	22					
	II	—	—	—	—	0	0	0	0	
	III	—	—	—	—	—	—	—	—	0
CYGRO	I	72	76	70	74					
	II	—	—	—	—	0	0	0	0	
	III	—	—	—	—	—	—	—	—	0
CLINACOX	I	69	51	43	19					
	II	—	—	—	—	0	0	0	0	
	III	—	—	—	—	—	—	—	—	0

The Average Weight Gains

The average weight gains which tabulated in the Table **2, 3** and **4** indicated that the survivour chickens in the groups **A,** B, **C** and **D** had less average weight gains than the control group G. But the chickens in the group F-1, **F-2, F-3** and **F-4** had same or little more average weight gains than the control group **G.** According to Dunnett's t test at confidence level **95%** the difference between the average weight gains of the groups **A,** B, **C, D** with control group **G** on the seven weeks old chickens were significance. But the difference between the average weight gains of the group **F-1, F-2, F-3, F-4** with control group G on the seven weeks old chickens were not significance. The graphs showed in the figure 1, 2, **3, 4, 5** and **6** indicated clearly about the growth comparison of those groups after challenged.

Table 2. The growth average of the body weight (in grams) of Groups A. B, C. D, F-1, F-2, F-3, F-4, and G Chickens in the BAYCOX experiment.

Tnbel 2. **Rata-rata** pertumbuhnn bernt **badan (gram)** nynm dnri kelompok A, B, C, D, F_1, F_2, F_3, F_4 **dan G pada penelitian BAYCOX.**

Group **Kelompok**	Age of chickens Umur nynm								
	1 day 1 hnri	1 week 1 minggu	2 weeks 2 minggu	3 weeks 3 minggu	4 weeks *4* minggu	5 weeks 5 minggu	6 weeks 6 minggu	7 weeks 7 minggu	8 weeks 8 minggu
A	38.3	118.3	222.5	399.2	575.5	778.3	1133.7	1158.5	1196.1
B	38.2	117.9	234.3	407.9	693.2	840.5	1075.8	1290.4	1449.9
C	38.1	118.4	237.2	415.3	623.1	877	1162.7	1372.5	1550.1
D	38.3	117.9	236	407.4	613.7	1027.3	1126.1	1405.2	1611.3
F-1	38.3	117.4	237.9	397.7	633.1	954.5	1278.9	1676.5	1904.1
F-2	38.2	117.2	236.5	397.7	635.6	959	1275.8	1671	1899.9
F-3	38	117.4	237.9	391.3	637.3	957	1276.7	1669.3	1880.1
F-4	37.9	116.7	236.6	441	582.9	933.7	1278.4	1654.5	1892.3
G	37.8	116.8	237.9	397.9	632.2	956.3	1274.5	1662.4	1896.6

Table 3. The growth average of the body weight (in grams) of Groups A, B, C, D, F-1, F-2, F-3, F-4, and G Chickens in the CYGRO experiment.

Tabel 3. **Rata-rata** pertumbuhan **berat badan** (gram) ayam **dari** kelompok A, B, C, D, F_1, F_2, F3, F_4 **dan** G pada **penelitian** CYGRO.

Group Kelompok	Age of chickens Umur ayam							
	1 day 1 **hari**	1 week 1 minggu	2 weeks 2 minggu	3 weeks 3 minggu	4 weeks 4 minggu	5 weeks 5 minggu	6 weeks 6 minggu	7 weeks 7 minggu
A	38.2	118.5	210.1	374.9	574.5	776.8	1128.1	1179.2
B	38	117.4	215.7	352.4	553.1	771.2	1068.9	1171.7
C	38	116.8	208.4	333	566.9	770.1	1124.1	1201.7
D	38	117.4	209.8	371.3	567.2	774.9	1145.4	1151.6
F-1	38.3	118	236.3	393.2	632.4	953.7	1277.8	1675.6
F-2	38.2	116.2	235.7	396.6	634.3	957.9	1274.4	1659.1
F-3	38	115.9	236	391.1	637.6	956.7	1276.2	1668.8
F-4	37.8	116.6	235.3	440.5	581.9	930.4	1277.7	1653.5
G	37.7	116.8	237.4	397.6	632.2	955.5	1274	1661.9

Table 4. The growth average of the body weight (in grams) of groups A, B, C, D, F-I, F-2, F-3, F-4 and G in the CLINACOX experiment.
Tnbel 4. Rata-rata pertumbuhan berat badan (gram) ayam dari kelompok A, B, C, D, F_1, F_2, F_3, F_4 dnn G padn **penelitian** CLINACOX.

Group **Kelompok**	Age of chickens **Umur ayam**							
	1 day **1 hari**	1 week **1 minggu**	2 weeks **2 minggu**	3 weeks **3 minggu**	4 weeks **4 minggu**	5 weeks **5 minggu**	6 weeks **6 minggu**	7 weeks **7 minggu**
A	38.187	118.82	226.94	384.76	579.919	778.438	1022.12	1199.52
B	38.069	119.17	233.672	400.156	606.769	848.769	1077.28	1296.88
C	38.036	118.48	233.049	412.816	624.494	892.772	1113.23	1397.67
D	38.199	118.37	233.01	404.106	617.197	898.320	1119.21	1465.935
F-1	38.363	118.2311	241.31	416.291	662.112	952.3133	1419.959	1608.306
F-2	38.357	118.5144	242.074	441.883	683.17	990.5822	1236.753	1640.22
F-3	38.248	116.572	245.443	446.551	662.843	963.5056	1253.261	1672.294
F-4	38.234	118.3589	243.168	447.826	714.917	1054.33	1399.197	1758.171
G	37.703	118.4178	238.594	397.768	630.836	954.394	1286.07	1658.58

The Feed Conversion

The feed conversion of the chickens in the group A, B, C and D which showed in the Table 5, 6, and 7, indicated more than the control group G, but feed conversion of the chickens in the groups F-1, F-2, F-3, and F-4 were more or less same as the control group G. According to Dunnett's t test at confidence level 95% the difference between the feed conversion of the chickens in the groups A, B, C, D with control group G on the 3, 4, 5, 6 and 7 weeks old were significance. But the difference between the feed conversion of the chickens in the group F-1, F-2, F-3, F-4 with the control group G on the 3, 4, 5, 6 and 7 weeks old were not significance. So the chickens in the group A, B, C and D were less effective to converse feed that the control or normal chickens, but the chickens in the group F-1, F-2, F-3 and F-4 were same effective as the control or normal chickens.

Table 5. The feed conversion of chickens in group A. B. C, D, F-1, F-2, F-3, F-4 and G (BAYCOX Experiment).
Tabel 5. Konversi makanan ayam kelompok A, B, **C**, D, F_1, F_2, F_3, F_4 **dan G (Penelitian BAYCOX).**

Group Kelompok	Age of chickens **Umur** nysm								
	1 day I hsri	1 week 1 minggu	2 weeks **2** minggu	3 weeks **3** minggu	4 weeks **4** minggu	5 weeks **5** minggu	6 weeks 6 minggu	7 weeks 7 minggu	8 weeks **8** minggu
A	—	1.04	1.25	2.03	2.09	2.14	2.21	2.24	2.3
B	—	1.04	1.25	1.97	2.08	2.12	2.18	2.21	2.24
C	—	1.04	1.25	1.87	2.02	2.07	2.11	2.2	2.21
D	—	1.04	1.25	1.76	1.95	2.05	2.1	2.17	2.19
F-1	—	1.04	1.25	1.48	1.63	1.76	1.85	1.93	2.01
F-2	—	1.04	1.25	1.49	1.66	1.74	1.84	1.94	2.02
F-3	—	1.04	1.25	1.51	1.65	1.74	1.83	1.96	2
F-4	—	1.04	1.25	1.5	1.65	1.73	1.85	1.94	2
G	—	1.04	1.25	1.5	1.65	1.75	1.84	1.95	2.01

Table 6. The feed conversion of chickens in group A, B, C, D, F-1, F-2, F-3, F-4 and G (CYGRO Experiment).
Table 6. Konversi makanan ayam kelompok A, B, C, D, F_1, F_2, F_3, F_4 dan G (Penelitian CYGRO).

Group **Kelompok**	Age of chickens **Umur ayam**							
	1 day **1 hari**	1 week **1 minggu**	2 weeks **2 minggu**	3 weeks **3 minggu**	4 weeks **4 minggu**	5 weeks **5 minggu**	6 weeks **6 minggu**	7 weeks **7 minggu**
A	—	1.04	1.55	2.05	2.08	2.15	2.23	2.25
B	—	1.04	1.57	2.01	2.07	2.17	2.24	2.26
C	—	1.04	1.54	2.04	2.09	2.13	2.2	2.21
D	—	1.04	1.58	2.06	2.1	2.18	2.22	2.24
F-1	—	1.04	1.24	1.54	1.63	1.73	1.84	1.92
F-2	—	1.04	1.26	1.55	1.62	1.76	1.81	1.93
F-3	—	1.04	1.25	1.51	1.65	1.74	1.83	1.95
F-4	—	1.04	1.23	1.53	1.66	1.78	1.82	1.97
G	—	1.04	1.25	1.52	1.64	1.75	1.82	1.96

Table 7. The feed conversion of chickens in group A, B, C, D, F-1, F-2. F-3, F-4 and G (CLINACOX Experiments).
Tabel 7. Konversi makanan pada ayam kelompok A, B, C, D, F_1, F_2, F_3, F_4 dan G (Penelitian CLINACOX).

Group **Kelompok**	Age of chickens **Umur ayam**							
	1 day **1 hari**	1 week **1 minggu**	2 weeks **2 minggu**	3 weeks **3 minggu**	4 weeks **4 minggu**	5 weeks **5 minggu**	6 weeks **6 minggu**	7 weeks **7 minggu**
A	—	1.04	1.25	2.1	2.15	2.2	2.25	2.30
B	—	1.04	1.25	2.0	2.1	2.15	2.2	2.25
C	—	1.04	1.25	1.95	2.0	2.1	2.15	2.2
D	—	1.04	1.25	1.90	1.95	1.97	2.0	2.1
F-1	—	1.04	1.25	1.65	1.70	1.74	1.85	1.94
F-2	—	1.04	1.25	1.65	1.70	1.74	1.93	1.94
F-3	—	1.04	1.25	1.65	1.75	1.75	1.95	1.96
F-4	—	1.04	1.25	1.60	1.70	1.73	1.92	1.95
G		1.04	1.25	1.60	1.70	1.75	1.90	1.90

The Lesion Score

The average of lesion scores in the group A, B, C, D, F-1, F-2, F-3, F-4 and G of the BAYCOX, CYGRO and CLINACOX experiments were tabulated in the Table 8. According to that table no coccidiosis or coccidiasis occur in the group F-1, F-2, F-3 and F-4, while in the groups A, B, C, and D coccidiosis or coccidiasis occur after challenged (Coccidiasis = +1 or +2, coccisiosis = +3 or +4). According the Turkey's Studentized Range Test indicate that the average lesion scores of the group A, B, C, and D have significance difference than the average lesion scores of the control group G. But the average lesion score of the group F-1, F-2, F-3 and F-4 have no significance difference than the control group G at the convidence level 95%.

Table 8. The average of lesion scores in the groups A, B, C, D, F-1, F-2, F-3, F-4 and G of the BAYCOX, CYGRO and CLINACOX experiment.

Tabel 8. Rata-rata skor pelukaan kelompok A, B, C, D, F-1, F-2, F-3, F-4 dan G dari penelitian BAYCOX, CYGRO dan CLINACOX.

Exp.	Large Group	Species	Groups								
			A	B	C	D	F-1	F-2	F-3	F-4	G
BAYCOX	I	E.t.	3.6	3.6	2.6	1.9	—	—	—	—	—
		E.m.	3.6	3.5	2.8	1.4	—	—	—	—	—
		E.a.	3.6	3.3	2.4	1.5	—	—	—	—	—
	II	E.t.	—	—	—	—	0.1	0.1	0.1	0	—
		E.m.	—	—	—	—	0.1	0.2	0.2	0.2	—
		E.a.	—	—	—	—	0.1	0.1	0	0.1	—
	III	E.t.	—	—	—	—	—	—	—	—	0
		E.m.	—	—	—	—	—	—	—	—	0
		E.a.	—	—	—	—	—	—	—	—	0
CYGRO	I	E.t.	3.5	3.4	3.4	3.8	—	—	—	—	—
		E.m.	3.6	3.6	3.4	3.6	—	—	—	—	—
		E.a.	3.2	3.5	3.6	3.3	—	—	—	—	—
	II	E.t.	—	—	—	—	0.2	0.2	0.1	0.3	—
		E.m.	—	—	—	—	0.1	0.2	0.2	0.1	—
		E.a.	—	—	—	—	0.2	0.1	0.1	0.2	—
	III	E.t.	—	—	—	—	—	—	—	—	0
		E.m.	—	—	—	—	—	—	—	—	0
		E.a.	—	—	—	—	—	—	—	—	0
CLINACOX	I	E.t.	3.7	3.1	2.9	2.1	—	—	—	—	—
		E.m.	3.6	3.0	2.5	1.7	—	—	—	—	—
		E.a.	3.7	2.9	2.1	1.8	—	—	—	—	—
	II	E.t.	—	—	—	—	0.2	0.1	0.1	0.1	—
		E.m.	—	—	—	—	0.2	0.1	0.1	0.1	—
		E.a.	—	—	—	—	0.1	0.1	0.1	0	—
	III	E.t.	—	—	—	—	—	—	—	—	0
		E.m.	—	—	—	—	—	—	—	—	0
		E.a.	—	—	—	—	—	—	—	—	0

E.t. = *Eimeria tenella;* E.m. = *Eimeria maxima;* E.a. = *Eimeria acervulina.*

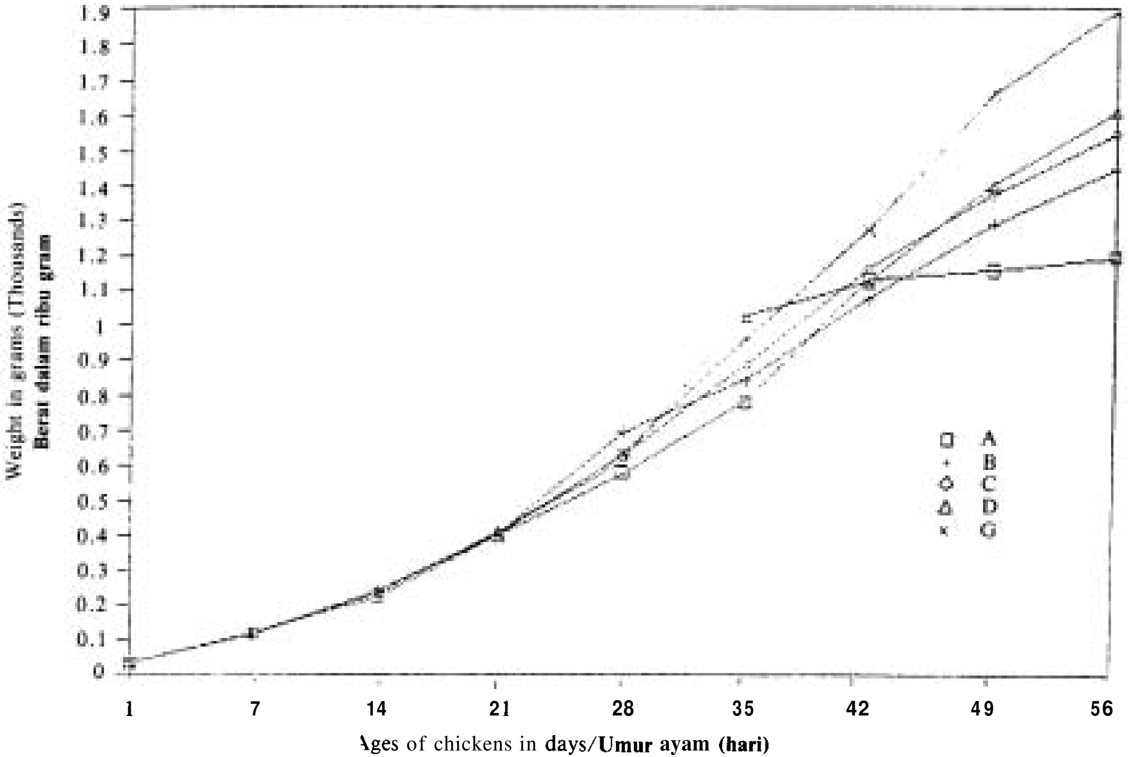


Figure 1. The growth average of the body weight in grams of chickens (Baycox Experiment).
Gambar 1. Rata-rata pertumbuhan berat badan ayam dalam gram (Penelitian Baycox).