

Herb-All™COCC-X in fattening broilers as an alternative to coccidiostats

Alternative to chemical treatment to control coccidia

Coccidia are ubiquitous in poultry flocks. In particular, the *Eimeria* species are widespread and cause major problems and losses. Today, the use of coccidiostats in poultry feed for the prevention and treatment of the diseases caused by these single-cell organisms is common. Consumers expect that nowadays and in the future less antibiotic substances will be used in animal production, to avoid antibiotic resistances. Natural alternatives are therefore highly needed. Three natural preparations were tested in comparison to a reference coccidiostat in a large trial with broilers.

Trial station & Trial preparation

The trial was carried out in the Czech Republic in an experimental station with a special separated trial unit with 30 pens (95 x 135 cm), each accommodating 25 chicks and it was possible to carry out infection experiments with live oocytes. Each pen was independent from the others and equipped with a feed device and three drinking nipples. The lighting and the unit temperature were automatically controlled. The litter consisted of clean and disinfected wood chips. For the trial, one-day old sexed ROSS 308 chicks were used. At day one all animals were weighed and assigned to the individual trial groups. At day 5 the lightest and the heaviest chick of each group were removed. Thus, 23 chicks per group remained in the trial.

Material and methods – trial procedure



Photo: Trial boxes with individual installations for water and feed supply and space for 25 chicks

The first trial series began on November 29, 2012, the second on March 1, 2013 and the third on September 5, 2013. All three trials lasted 35 days. Except for the non-infected control animals, all animals were inoculated with 5,000 oocytes of each of the species *Eimeria acervulina*, *E. maxima* and *E. tenella* on day 16 of the trial. From day 1 to day 10 of the experiment, the animals were fed with a starter feed, from day 11 to day 25 with grower feed, then until the day of slaughter at day 35 with finisher feed. Weight gain and feed consumption were registered per group. At day 21, the incidence of foot lesions was noted. 18 boxes were available per trial series, with three replicates for each of the 6 groups, and over all three series 9 replicates per trial group. In total there were 225 animals per group.

The following trial groups were tested:

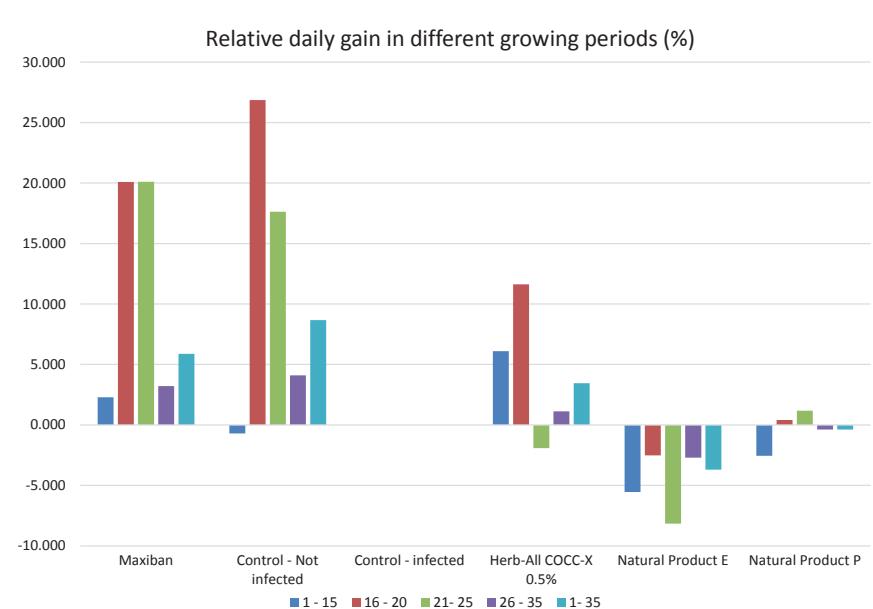
- Positive Control with the use of 90 ppm Narasin and Nicarbazin (Maxiban) throughout the fattening period, and with oocyte infection (group Max)
- Negative control without any supplement, and with oocyte infection (basal group N+)
- Negative control without any supplement, and without infection (group N)
- Natural alternative 1 with 500 ppm Herb-All™ COCC-X and with oocyte infection (group COCC-X)
- Natural alternative 2 with 650 ppm of the product E as per producer recommended dosage, and with oocyte infection (group Alt-E)
- Natural alternative 3 with 500 ppm of the product P as per producer recommended dosage, and with oocyte infection (group Alt-P)

The three natural alternative products are composed as follows:

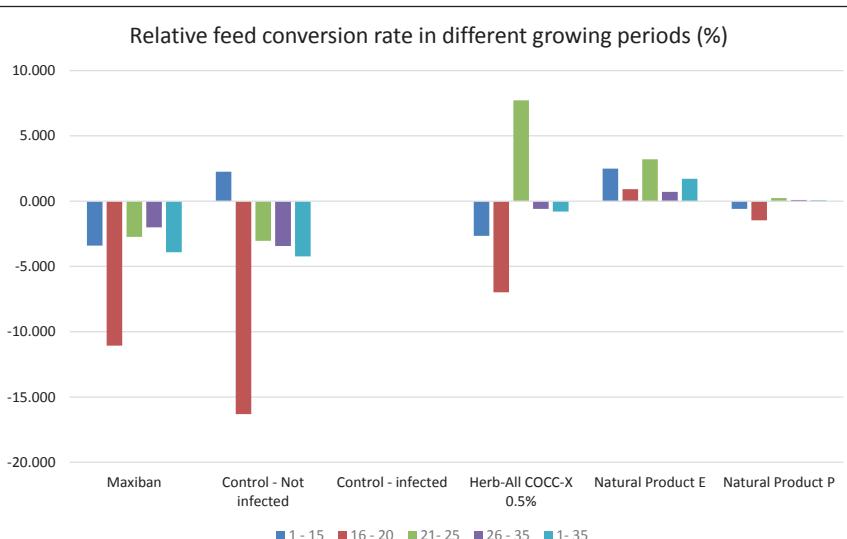
- Herb-All™COCC-X: mixture of select pure herbs, used in Ayurveda medicine, to support natural defense of the animals against pathogens (prophylactic protection), finely ground for good mixture in premix and feed
- Alternative E: Essential oils on an inorganic carrier, according to manufacturer good effect on the intestinal flora and to protect against coccidia infections
- Alternative P: plant extracts and spices to regulate the intestinal flora in case of digestive problems, according to manufacturer

Results

The results in figure 1 and 2 show the relative deviation of each trial group from the results of the infected control group (= basal group N+). This relative performance approach improves the comparability of the results over the three trial series even if absolute performances fluctuated between different series. The average results of the basal group N+ are shown in the table below. The first graph shows the average daily gain during the four observation periods (day 1-15; 16-20 day, 21-25 day and 26-35 day), as well as during the entire test period. In the first period, the chickens of group COCC-X had the highest growth rates. In the first period after the oocytes infection group Max, N + and COCC-X performed better than the base group, whereas the growth of birds from group Alt-E and Alt-P was lower. The impact of the infection was obvious. In the last and most important phase of the fattening period the chicks show similar growth rates than before the infection. The two groups Alt-E and Alt-P had lower daily gains than birds from the basal group N+. Over the entire fattening period, the animals of group N (no supplement and no infection) had the highest growth rates, followed by those of the Max and COCC-X groups. The overall growth rates of animals in groups Alt-E and Alt-P had a similar or even lower growth than animals of group N+. Thus, no effect on growth could be measured.



Graph 1: Average daily gain of trial groups in different growing periods compared to infected control group (%). Infection took place at day 16.

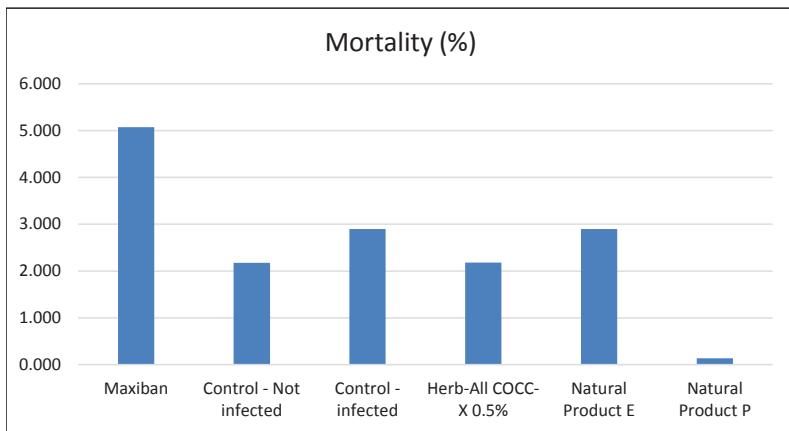


Graph 2: Feed conversion rate of trial groups in different growing periods compared to infected control group (%). Birds were infected with *Eimeria* oocytes at day 16.

Feed conversion in the pre-challenge phase showed a similar picture as seen for growth rates. Animals of groups N, Max and COCC-X showed a better FCR than birds of the group N+. After the coccidia challenge the group Max has shown a positive response. Immediately after the challenge animals of the COCC-X group still showed a better feed efficiency than those from the basal group N+. Only in the second 5 days after the oocyte infection (day 21-25) these animals required more feed than the basal group N+. FCR for group Alt-E was worse than group N+ during the entire test period and group Alt-P was comparable to group N+.

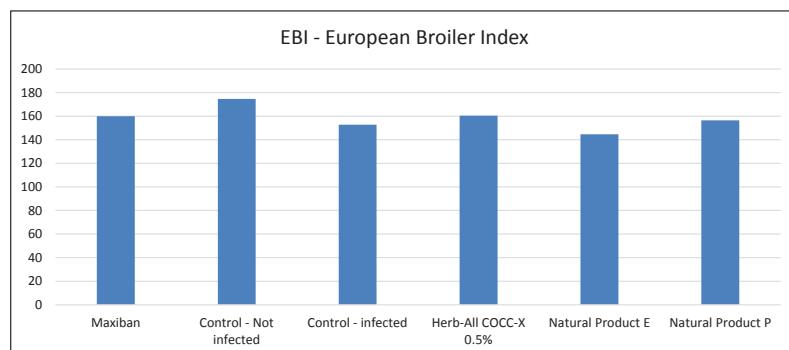
PERIOD (d)	Daily gain (g)	Daily feed intake (g)	FCR (kg/kg)	Live weight (kg)	Mortality (%)
1-15	25.98	36.57	1.409	0.4381	
16-20	51.99	83.76	1.624	0.6932	
21-25	66.73	111.23	1.670	1.0025	
26-35	85.21	152.46	1.793	1.8589	
1-35	49.16	80.77	1.645	1.8589	2.90

Table: Average results for 3 replicates of the infected control group (= basal group N+) during different trial periods



Graph 3: Mortality over the whole trial period of 35 days

Mortality during the whole trial period of 35 days is shown in Figure 3. Group Max had more than 5% losses during the trial, substantially above the other groups. In most groups mortality ranged from 2 to 3%, and there were almost no losses in the group Alt-P.



To facilitate comparison of the overall performances it is pertinent to use the European Broiler Index (EBI) which is defined as follows:

$$\text{EBI} = \{[\text{Daily gain (g)} \times \text{survival rate}] / 10\} \times \text{feed conversion}$$

The results are shown in figure 4. Group N+ performed best, followed by group COCC-X and Max and then group Alt-P and N. The lowest EBI was calculated for group Alt-E.

Graph 4: European Broiler Index (EBI) of the different trial groups reflecting production performances over the whole trial period of 35 days

Discussion and conclusion

Due to experimental restrictions the trial ended at day 35. This fact and the specific housing conditions shall be considered when interpreting the results compared to commercial flock data. A second element to consider is that all the animals - except for the non-treated control animals - were infected at day 16 with a large dose of oocytes. This trial set up has been developed and implemented over time to test the efficacy of drugs and rely on a sharp spot infection load to show their very specific abilities to eliminate oocytes of coccidia. Such infection dynamics are not representative of common poultry farming units. Instead, the infection pressure grows over time, both along a flock cycle and along repeated cycles, leading to a more progressive infection patterns. Non-drug products, and in particular natural products like herbs, are often to be used prophylactically, to strengthen the birds own defense capacities and minimize the infection burden on performance.

All results were compared to the non-treated and infected control group (basal group). The comparison of performance between the two control groups before the coccidia infection with oocytes shows very clearly that the challenge was correct, since the results before day 16 were congruent. In this pre-challenge phase, animals fed with Herb-All™COCC-X had the best performances of all experimental groups (+6.1% growth). The other two alternative natural products had no effect on growth or on FCR in this initial phase of the trial. These extract-based products seem to have even a negative impact on growth. In the first phase after the infection, Herb-All™COCC-X group continued to have good performances over the first week and only the second week after the infection – which takes 4-7 days – have shown lesser growth compared to the basal infected group. However, with very few losses. Maxiban has shown the expected pathogen protection, but apparently adding some stress on the birds'

physiology as the group mortality suggests. Mortality was rather low in all groups compared to commercial flocks, with the exception of the Maxiban group. This phenomenon has been previously noticed. Nicarbazin appears to cause the increased mortality rate (Long et al, 1988). The use of EBI as performance indicator reveals the potential of the different products on a context that is closer to farming for the boiler producer. All infected groups had a lower index than the basal group. The best results (average over three replicates) among the infected groups were measured in the Herb-All™COCC-X group, followed by Maxiban and alternative product P. Alternative product E was not worthwhile.

The tests have shown that the herbal mixture Herb-All™ COCC-X is an effective alternative to today's practice with the use of Coccidiostats. And Herb-All™COCC-X was comparable to Maxiban production performance in this trial with spot coccidia challenge.

A more progressive infection pattern is expected to show even better performance data in favor of Herb-All™COCC-X.

Literature

Anticoccidial activity of combinations of narasin and nicarbazin. Long P.L., Johnson J., McKenzie M.E.; Pout. Sci., 1988, 67(2), 248-52.

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