Economics of broiler intestinal disorders

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Impaired intestinal health is one of the major problems in broiler production, which will be easily recognised by farmers, nutritionists and veterinarians.

A recent questionnaire among broiler farmers in the Netherlands indicated that 45% of them observed an increased incidence of health problems in the starter phase and 57% in the grower/finisher phase since the antimicrobial growth promoter (AGP) ban became effective.

Impaired intestinal health in broilers interacts with nutrition and management by reducing nutrient digestion and utilisation and consequently increasing the incidence of wet litter problems.

Furthermore, the overall production performance will be reduced and mortality will be higher than usual, which negatively affects the profit of poultry farmers.

In this article we have tried to quantify the economics of intestinal disorders in broiler production, taking both losses in body weight gain (BWG) and feed efficiency, increased mortality and increased veterinary costs into account.

Effect on productivity

Since the last decade many experiments were conducted to quantify the impact of the intestinal microbiota on nutrient digestion, intestinal barrier function, and production performances.

Estimates based on several trials conducted at Schothorst Feed Research indicated that in healthy broilers the ban on AGPs reduced BWG by 0 to 3% and increased feed conversion ratio (FCR) by 1 to 4%, whereas in case of coccidiosis and/or bacterial infections effects were 3 to 6% for BWG and 4 to 7% for FCR. How come?

The general mode of action of AGPs is to limit bacterial growth in the proximal intestinal tract and to control growth of potential pathogenic groups of micro-organisms in the intestine.

It is well accepted that bacterial overgrowth in the proximal small intestine induces a cascade of reactions in the gastrointestinal tract, like reduced nutrient digestibilities, increased intestinal turnover rate and impaired barrier function, increased bacterial translocation and, consequently, induced inflammatory responses.

Inflammation following bacterial infections reduces feed intake, BWG and even bone quality. As a second mode of action, it is hypothesised that AGPs limit the inflammatory response due to the intestinal microbiota host interactions.

Clostridial infections

Clostridial infections, which are known to be a causative agent for necrotic enteritis (NE), are emerging since AGPs are no longer used.

It is demonstrated that most mucus production stimulating factors (for example viscosity increasing feed ingredients (wheat, barley and rye), increased bacterial activities in proximal small intestine (dysbacteriosis) and/or diseases that induce gut wall damage like subclinical coccidiosis) are predisposing factors for necrotic enteritis.

Challenge experiments in broilers conducted at Schothorst Feed Research using a subsequent coccidiosis and Clostridium perfringens infection showed a reduction in feed intake up to 50% within two days post infection compared to the uninfected healthy controls. During the week after infection feed intake in the infected groups was typically 20 to 25% lower than in the control group, which inevitably would have a negative impact on BWG.

Klasing quantified the consequence of an E. coli infection in broilers on BWG, being approximately 30% lower in the infected ones. Two thirds of this reduced gain was due to the anorexia post infection and one third due to the inflammatory responses.

Furthermore, the consequence of the experimentally induced sub-clinical necrotic enteritis infection was quantified using broilers that were supplemented or not with an antibiotic.

Effects of medication on production performances over the entire 35 day experimental period were significant – medication resulted in a 100g higher body weight at the end of the experiment and a 3% better FCR compared to the non-medicated group.

From the experiments described above, it

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Table 1. Financial consequence of intestinal disorders on gross margins in broiler production (per 100 broilers), given as € (incl. VAT). Calculations are based on the following assumptions: reduced BWG 5%; increased FCR 3%. Adapted from Anonymous (2006); Broiler and feed prices for starter, grower and finisher phase (May 2007). Housing, litter, and manure costs may vary among countries; European Poultry Efficiency Factor = liveability x live weight in kg/(age in days x FCR); body weight in broilers with intestinal disorders is corrected for 1% mortality specifically related to those disorders, resulting in a 0.5% lower feed consumption.

	Healthy broilers			Broilers with intest. disorders		
	Amount	Price per unit	Total	Amount	Price per unit	Total
Sales revenue						
Body weight (kg)	207.5	0.72	**149.40**	195.1	0.72	**140.51**
Cost broiler and feed						
One day old chicks	100	0.27	27.00	100	0.27	27.00
Feed (kg)	359	0.28	100.85	350	0.28	98.05
			127.85			125.05
Variable costs						
Housing, litter, and manure costs			12.95			13.60
Health care			3.90			5.10
			16.85			18.70
Gross margin/100 birds			**4.70**			**-3.24**
EPEF			**297**			**271**

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can be concluded that intestinal disorders do have a huge impact on production performances. Feed intake as well as BWG may be decreased by 5% and FCR may be increased by 3% when broilers suffer intestinal disorders.

Moreover, data from the Animal Health Service in Deventer demonstrate a 1% increase in mortality due to intestinal disorders. Those differences in performance are included in the calculation of the gross margin (see Table 1).

Intestinal disorders in a broiler flock can have a detrimental effect on the gross margins of broiler production, which adds up to €8.00 (incl. VAT) per 100 broilers. The European Poultry Efficiency Factor can be reduced by 10%.

Since the discussion on the AGP ban started within the European Union, many research projects were initiated to develop AGP alternatives.

Schothorst Feed Research is also involved in testing the efficacy of such alternatives on production performances and gut health in poultry, but to our knowledge so far no single product is shown to be as effective as AGPs. As a prebiotic, Vetmostan is regarded to be an alternative for AGPs.

Vetmostan is a novel concept prebiotic in that it is an exo-cellular MOS (mannan oligosaccharides).

These exo-cellular MOS are actively secreted by a certain yeast, which is cultured for this particular reason. As it is exo-cellular, and not a part of the cell wall as most other MOS products, its availability is very high.

In a trial with floor housed broilers at Schothorst Feed Research, it was shown that Vetmostan resulted in a significantly improved BWG (2100g (Vetmostan) compared to 2060g (control)) and FCR (1.568 (Vetmostan) compared to 1.598 (control)) from 0 to 36 days of age.

Future studies might reveal that specific combinations of additives and treatments generate further control of impaired intestinal health in broilers and hence improve the economics of broiler production. ■

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