

The effects of a multiple-enzyme combination in maize-soya diets for broiler chickens

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Abstract

1. The use of a multiple-enzyme combination in maize-soya diets for broilers.

The effect of a multiple-enzyme combination in mash and pelleted vegetarian maize-soya diets for broilers was evaluated in terms of apparent excreta- and ileal nitrogen- and amino acid digestibility and production performance. Two separate digestibility trials and one performance trial were conducted. For Trial 1, the apparent nitrogen (N) - and amino acid (AA) digestibility was determined by the collection of the excreta (total collection method) and in Trial 2 from digesta collected at the terminal ileum (ileal digestibility method). Production performance was also recorded in Trial 1. In Trial 3, the effect of the multiple-enzyme combination in potentially improving performance of broilers in commercial conditions was evaluated. Broilers were fed a balanced- and low apparent energy (AME) vegetarian maize-soya diet with the addition of the multiple-enzyme combination. The addition of enzymes improved the apparent excreta- and ileal N digestibility of the mash diets during the period 14-21 d, and the ileal N-digestibility of the pelleted diets at 28 and 35 d of age. Conflicting results with regard to apparent excreta- and ileal AA digestibility were found. By both methods the digestibilities of threonine (Thr), methionine (Met) and phenylalanine (Phe) (14-21 d) and Cys (22-28 d and 29-35 d) were improved by the addition of the enzyme combination to the mash diets. Over the entire experimental period (14-35 d) the ileal digestibilities of histidine (His), Cys and leucine (Leu) of the mash diets were improved by 0.2 %, 0.2 % and 1.9 % respectively, following enzyme addition. By both methods the digestibilities of Thr, arginine (Arg), Met, Cys, Phe and Leu (14-21 d), serine (Ser), Arg, glutamic acid (Glu), Val, His, aspartic acid (Asp), lysine (Lys), proline (Pro), Met, tyrosine (Tyr), Phe and Leu (22-28 d), and Pro (29-35 d) were improved by the combination of enzymes and pelleting. For the entire experimental period (21-35 d), the ileal digestibilities of Ser, His, Lys, Met, Tyr, Cys, Phe and Leu was improved by the combination of enzymes and pelleting, indicating enzymatic activity was not destroyed by cold pelleting at 60 - 80°. The improvements in apparent nitrogen- and AA digestibilities were, in most cases, not reflected in production performance, although the combination of enzymes and pelleting resulted in improved body weight gain (BWG) for the first two weeks of chicks life and significantly improved the feed conversion ratio (FCR) during the second week of the chicks' life. The effect of the multiple-enzyme combination on the production performance of broilers on a low AME- and commercial diet was mostly non-significant except for a significantly lower feed

intake of the balanced diet for the fourth and fifth week of chick's life following enzyme addition. A financial calculation showed, however, that the enzyme combination might increase profitability of a nutritionally balanced vegetarian maize-soya diet for broilers.

Uittreksel

1. Die invloed van 'n meervoudige ensiem-kombinasie in mielie-soya rantsoene vir braaikuikens

Die invloed van 'n meervoudige ensiem-kombinasie in meel- en verpilde mielie-soya rantsoene vir braaikuikens is geëvalueer in terme van skynbare fekale- en ileale stikstof- en aminosuur verteerbaarhede en produksie prestasie. Twee verterings- en een prestasie eksperiment is onderneem. Vir die eerste eksperiment is die skynbare stikstof (N)- en aminosuur verteringskoeffisiënte vanuit die mis bepaal (fekale verteringskoeffisiënte) en in eksperiment twee deur gebruik te maak van die digesta wat uit die terminale ileum ingesamel is (ileale verteringskoeffisiënte). Die prestasie van die braaikuikens is ook in eksperiment een aangeteken. In die derde eksperiment is die prestasie van braaikuikens op 'n gebalanseerde en 'n lae skynbare metaboliseerbare energie (AME) rantsoen geëvalueer, soos beïnvloed deur die meervoudige ensiem-kombinasie. Die ensiem-kombinasie het die skynbare fekale- en ileale N-verteringskoeffisiënte van die meel dieëte verbeter maar slegs vir die periode 14-21 dae ouderdom. Die ensiem kombinasie in die verpilde dieëte get gelei tot verbeterde ileale N-verteerbaarhede by 28 en 35 dae ouderdom. Teenstrydige resultate met betrekking tot die skynbare fekale- en ileale aminosuurverteerbaarhede is gevind. Vir albei die metodes is die verteerbaarhede van Thr, Met en Phe (14-21 d) en Cys (22-28 d en 29-35 dae) verbeter deur die insluiting van die ensiem-kombinasie tot die meel dieët. Oor die volle eksperimentele periode (14-35 d), is die ileale verteerbaarhede van His, Cys en Leu in die meel dieëte verbeter met onderskeidelik 0.2 %, 0.2 % en 1.9 %, as gevolg van die toevoeging van die ensiem-kompleks. Vir albei metodes is daar gevind dat die skynbare verteerbaarheid van Thr, Arg, Met, Cys, Phe and Leu (14-21 d), Ser, Arg, Glu, Val, His, Asp, Lys, Pro, Met, Tyr, Phe en Leu (22-28 d) en Pro (29-35 d) verbeter kan word deur die insluiting van die ensiem-kombinasie voor verpilling. Vir die volle eksperimentele periode (14-35 d) is die skynbare ileale verteringskoeffisiënte van Ser, His, Lys, Met, Tyr, Cys, Phe en Leu verbeter deur die kombinasie van verpilling en ensieme wat dus aandui dat ensiematiese effektiwiteit nie betekenisvol beïnvloed is deur koue verpilling teen temperature van 60 – 80 °C nie. Die verbetering in skynbare verteerbaarhede van stikstof en aminosure is egter nie weerspieël in die prestasie van die braaikuikens nie, alhoewel die kombinasie van ensieme en verpilling gelei het tot hoër ligaamsmassa toename in die eerste twee weke van kuikens se lewe en ook tot 'n betekenisvolle verbetering in voeromset

verhouding gedurende die tweede week van lewe. Die effek van die ensiem-kompleks op die prestasie van braaikuikens op 'n lae metaboliseerbare (AME) en gebalanseerde mielie-soya dieët was oor die algemeen nie betekenisvol nie, behalwe vir 'n betekenisvolle laer voerinname van die gebalanseerde rantsoen as gevolg van die toevoeging van die ensiem-kompleks vir die vierde en vyfde week van kuikens se lewe. 'n Finansiële berekening het egter aangedui dat die toevoeging van die ensiem-kombinasie tot die gebalanseerde mielie-soya rantsoen vir braaikuikens mag lei tot verhoogde winsgewendheid.