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Effects of a high-concentrate diet on rumen pH and epithelial transcriptome expression in Holstein cattle

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Rumen pH and the expression of the epithelial transcriptome were investigated in cattle fed with a high-concentrate diet to reveal the transcriptomic adaptation of the ruminal epithelium. Four rumen-cannulated healthy Holstein cattle weighing 192±12 (mean±SE) kg were studied. The cattle were fed a high-concentrate diet, in which the ratio of roughage to concentrate was 2:8, or hay to satiation for one week four times each. During the experiment, rumen pH was measured continuously every 10 min using a radio transmission system (YCOW-S; DKK-TOA Yamagata, Yamagata, Japan). Rumen papillae samples were collected from the ventral sac of the rumen at 1 week after the high-concentrate (CON group) and hay satiation (HAY group) feedings in the fourth experiment. A customized bovine oligonucleotide microarray comprising 15,268 unique genes (GPL9284; Agilent Technologies) was used to detect genes expressed in the rumen papillae in a one-color microarray analysis. Pathway and network analysis of differentially expressed genes were performed using ingenuity pathway analysis (IPA) software (Ingenuity Systems, Redwood City, CA, USA). The 24-h mean pH of the ruminal fluid in the CON group was significantly ($P<0.05$) lower than that in the HAY group. Using IPA, the *CLCA3P*, *PENK*, *MYBPC3*, *CD3G*, *SLITRK2*, *PRSS27*, *MUC1*, *PHLDA2*, *LOC10272488/PRODH*, and *SYNPR* genes were identified as activated upstream regulators, and the *DES*, *VNN1*, *SYT1*, *BMP6*, *MYO7B*, *FHL1*, *PI3C2G*, *STC1*, *DUSP26*, and *HSD11B2* genes were identified as activated downstream regulators. Differentially expressed genes that were significantly ($P<0.05$) expressed in the CON group included transporter genes (*CLC25A19*, *SLC25A40*, *SLC16A1*, *SLC13A2*, *SLC25A45*, *SLC23A1*, *SLC27A2*, *SLC23A3* and *SLC27A3*), long-chain fatty acid oxidation genes (*ACADS*, *ACADL* and *ACADM*), an insulin-like factor gene (*IGFBP6*), and cholesterol genesis genes (*ACAT2* and *FDFT1*). These results suggest that feeding cattle a high-concentrate diet decreases the rumen pH, which in turn affects the expression of the ruminal epithelial transcriptome. Specifically, genes related to cellular inflammatory reactions, the maintenance of homeostasis, and the cytoskeleton appear to be important for the short-term adaptation of the ruminal epithelium in cattle fed a high-concentrate diet.

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Role of germinated feed supplementation on growth of broilers

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Poultry farming in India, in spite of several constraints, has progressed considerably during the last decade. Poultry production in India was confined to backyards till recently. Local breed of birds were reared for the supply of eggs and meat. The increasing demand for poultry products due to higher protein and nutritive values necessitates augmenting the supply of these poultry product. The present study has been undertaken to examine various aspects related to the growth and development of poultry production under natural conditions using natural least costly products in the country. Supplementation of germinated sorghum in the diets of broilers in place of normal maize as the grain part gives very good results in term of better growth performance of the broilers as well as the taste of the broiler meat. The experiment was conducted on 200 broiler day old chicks, which are randomly divided into five groups of 40 chicks each. The germinated sorghum was added as 25, 50, 75 and 100% of the total grain portion. Group 1 is kept as control, in group 2 the germinated sorghum was added 25%+75% normal sorghum, group 3 the ratio is 50:50, group 4 it was 75:25 and in group 5 100% germinated sorghum is added to the feed of broilers. The live body weight and feed conversion efficiency was taken every week. It was observed that when the 50% and 75% germinated sorghum was added in the feed the growth rate was significantly higher than the other supplemented and non-supplemented groups. Likewise the feed conversion efficiency was also significantly higher which means the bird has taken less feed but the conversion efficiency to the meat was more. On the basis of this it is concluded that the use of germinated grains give much profit as there was no use of costly growth promoters in this study.

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