RESEARCH ABSTRACT

ANIMAL SCIENCE

Title: Development of a Practical Net Energy System (productive energy) that allows for the Capture of Ingredient Cost Savings Expected from NE systems with Predictable Performance
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Scientific abstract:

The net energy (NE) system describes the useful energy for growth better than the metabolizable energy (ME) system. Therefore NE system should demonstrate a more reliable animal response when a diverse set of ingredients are used, but this fact needs to be demonstrated in practice. Two experiments were conducted. The first experiment compare growth performance, carcass characteristics and financial returns in diets with a cumulative addition of co-products and formulated with the ME and the ME systems. 944 gilts and 1,110 castrates (BW=40.8±0.5 kg) were allotted to separate pens and assigned to one of 5 different feeding programs according to a randomized complete block design. A simple corn-soybean meal control (CTL1) served as the basis to establish ME and NE specifications for both programs. The following two treatments included DDGS (CTL1+DDGS, ME) and (CTL1+DDGS, NE), the last set of two diets contained both DDGS and corn germ meal (CTL1+DDGS+CGm, ME) and (CTL1+DDGS+CGm, NE). Fat varied to achieve either ME or NE targets. Pigs were harvested at a mean BW of 130.3+4.0 kg., growth performance, feed efficiency and carcass data were collected. Data generated were analyzed using the Mixed procedure of SAS. No differences were observed among treatments for whole-body ADG (P=0.18), ADFI (P=0.12) or G:F ratio (P=0.18). Total carcass gain was different among treatment programs (P<0.03) with the greatest difference between CTL1 (66.7 kg) and CTL1+DDGS+CGm ME and NE treatments (64.6 kg). Although not statistically different (P > 0.05), carcass gain tended to be greater for the NE vs. ME DDGS (66.4 vs. 65.1 kg) and for CTL1+DDGS+CGm programs (65.0 vs. 64.3 kg). Carcass G:F ratio behaved similarly for CTL1, CTL+DDGS ME-NE and CTLl+DDGS+CGm ME-NE respectively: 0.258, 0.254, 0.257 and 0.256, 0.259 (SEM 0.001, P=0.133). FOM lean percent was similar among treatments (P=0.43).In the second experiment apparent total tract digestibility of GE and Nitrogen utilization was calculated in diets with a constant or declining NE content. 40 gilts (BW=38.5±0.4 kg) were randomly assigned to 5 treatments. A control corn-soy based control diet (CTL2), a diet similar to the CTL2 but containing 6% each of corn DDGS, corn germ meal and wheat middlings with NE constant relative to CTL2 (18NE-CON), or allowed to decline (18NE-DEC), or similar diets but with 12% each of the same co-products and NE held constant (36NE-CON) or allowed to decline (36NE-DEC). Constant NE in the CON treatments was achieved by adding fat. Diets were formulated for both growing (40 to 70 kg) and

finishing (70 to 110 kg) periods. For each period urine and feces were collected. Data were analyzed using the MIXED procedure of SAS. In growing period, ATTD of GE decreased in all co-product diets compared to the CTL (85.3 vs. 79.9% for average of 18NE and 36NE; $P<0.01$). There were no differences between NE-CON and NE-DEC (80.5 vs. 79.3%; $P>0.05$). In finishing period, ATTD of GE also decreased in co-product diets compared to the CTL2 (87.1 vs. 82.6% for average of 18NE and 36NE; $P<0.01$). Unlike growing period, the 18NE diets had a higher ATTD of GE compared to 36NE diets ($P<0.05$). There were no differences between NE-CON and NE-DEC (82.7 vs. 82.5%; $P>0.05$). Nitrogen retention declined on all co-product diets in the growing period (40.6 vs. 35.5% for average of 18NE and 36NE; $P=0.01$) and tended to decline in the finishing period (35.0 vs. 30.2% for average of 18NE and 36NE; $P=0.08$). There were no differences between CON and DEC diets at 18NE or 36NE ($P>0.05$).