

## RELATIONSHIP BETWEEN THE QUANTITY AND QUALITY OF CARBOHYDRATES AND THE DIGESTIBLE ENERGY CONTENT OF WHEATS FOR WEANER PIGS

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Both the quantity and the quality of non-starch polysaccharides (NSP) of wheat are known to influence the apparent metabolisable energy (AME) content for broiler chickens (Annison, 1991). The quantity of NSP and composition of the soluble NSP fraction are negatively correlated to the AME value of wheat (Choct and Annison, 1990; Annison, 1991). It is thought that the branching structure of starch (amylopectin) and arabinoxylan (arabinose branching from a xylose backbone), which is the major NSP in wheat, may disturb the close packing between the polysaccharide polymer chains making it more digestible than a less-branched polysaccharide structure (Bacic and Stone, 1981). The aim of this study was to establish correlations between the quantity and quality of carbohydrates and the digestible energy (DE) content of wheats fed to weaner pigs.

Wheat samples (n=11) harvested in 1999/2000 from south-western Australia were used. The experimental diet consisted of 90% wheat and 10% additives (canola oil, vitamin-mineral mix, Celite® as an indigestible marker). The NSP (total, soluble and insoluble) and starch (amylose, amylopectin) content of wheats were analysed 5-7 weeks after harvest and the DE content of each wheat was determined previously (Kim *et al.*, 2001). Pearson's correlation analysis was used to establish relationships between DE and chemical parameters.

**Table 1. Linear correlations between carbohydrate composition and digestibility coefficients of dry matter (DC<sub>DM</sub>), gross energy (DC<sub>E</sub>), and digestible energy (DE) content of wheat.**

	DC <sub>DM</sub> (%)	DC <sub>E</sub> (%)	DE (MJ/kg as is)
Total Starch	0.423	0.459	0.554
Amylose	-0.526	-0.585	-0.513
Amylopectin	0.579	0.635*	0.673*
Amylose:amylopectin ratio	-0.634*	-0.698*	-0.648*
Soluble-NSP	-0.612*	-0.676*	-0.696*
Soluble-xylose	-0.730*	-0.760**	-0.678*
Soluble-arabinoxylan	-0.624*	-0.592	-0.522
Arabinose:xylose ratio	0.521	0.654*	0.474

\*P<0.05, \*\*P<0.01.

The soluble NSP content, but not the total or insoluble NSP content, of wheat was negatively correlated to the digestibility of dry matter, energy and DE content of wheat (P<0.05). Amylopectin branching from the amylose backbone of starch was positively correlated (P<0.05) to digestibility of gross energy and DE content of wheat. Consequently, a significant negative correlation (P<0.05) was found between the amylose:amylopectin ratio and digestibility parameters, indicating the importance of the chemical structure of starch in the digestion process. Similarly, arabinose branching from the xylose backbone (arabinose:xylose ratio) was positively correlated to digestibility of energy. The results demonstrate the importance of the chemical structure of the carbohydrate fraction for digestion processes in wheat-based diets for weaner pigs.

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