



Effect of origin and quantity of starch on *in vitro* digestibility and acidogenicity of cow diets

Micek P., Kowalski Z.M., Szufnara T., Gajówka T.

University of Agriculture in Krakow, Faculty of Animal Sciences, Poland



Introduction

- Starch is the most important energy source in animal feeds, and cereals are the main starch source in the concentrates for dairy cows. Starch digestibility in the rumen depends as much on the species and variety of the cereals, as on its quantity in the diet. Too high content of rapidly degradable starch can cause rumen acidosis. Therefore, when balancing rations for high yielding cows it is necessary to draw attention to both, the content of starch and its susceptibility to degradation in the rumen. For this reason, it is necessary to use proven methods to assess potential risk of rumen acidosis caused by an inappropriate composition of the ration. The determination of so called „acidogenicity” of diets or *in vitro* true digestibility may be a potential method.
- The aim of this study was to determine the effect of increasing proportion of concentrate in the diet and an origin of starch (rapidly or slowly degradable) in the TMR diets for dairy cows on *in vitro* true digestibility (IVTD) and organic acids production (acidogenicity; AV).

Materials and methods

- The experiment was carried out on **18 TMR diets** consisted of corn silage, alfalfa silage, grass hay and concentrate mixture prepared in **2 series**.
- Initial concentrate to forage ratio (50%/50% DM) as well as the roughages content in the diet were established based on the recommendation for a lactating cow (35 kg of milk per day). Then, the experimental diets were prepared in the laboratory conditions by changing the concentrate to forage ratio in the range from **10 to 90% DM**.
- Concentrate mixtures contained soybean meal (30%) and **cereal grain** (70%):
 - wheat** (rapidly degradable starch) or – **serie 1** of diets (**W**)
 - maize** (slowly degradable starch) – **serie 2** of diets (**M**).
- Chemical composition, **IVTD** (48h incubation; Ankom, USA) and **AV** according to Wadhwa et al. (2001) were determined.
- Data were subjected to one-way analyses of variance using the PROC GLM and the PROC REG of SAS.

Results

- Regardless of starch origin, increasing of concentrate in the diet increased IVTD.
- Diets contained **W** grains, compared to **M**, had higher IVTD but only for 10 and 20% share of concentrate in the diet ($P<0.05$).
- A positive correlation ($P<0.01$) between the share of concentrate in the diet and its AV was found.
- Regardless of concentrate share, TMR made with **W** was characterized by higher AV.
- The equations for estimation of AV based on either starch or ADL content in the diet were proposed.

Conclusions

- The determination of AV or IVTD of TMR diets may be a useful method for proper selection of feed ingredients for TMR formulation.
- In this context, AV is more precise than IVTD parameter used to define an optimal quantity of cereal grains in the diets which differ in the rate and extent of starch degradation in the rumen.

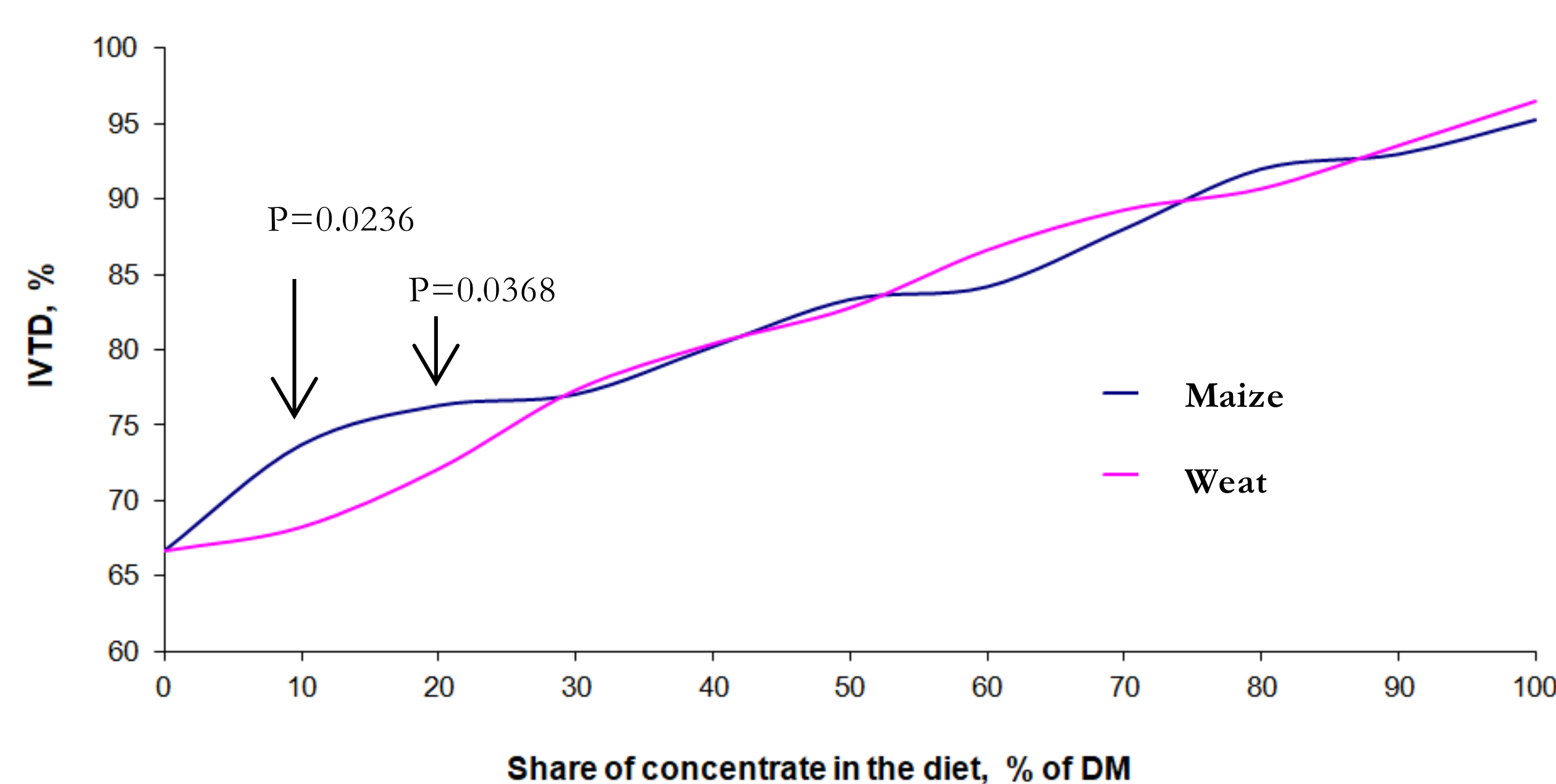


Figure 1. Relationship between *in vitro* true digestibility (IVTD) and the share of concentrate in the diet

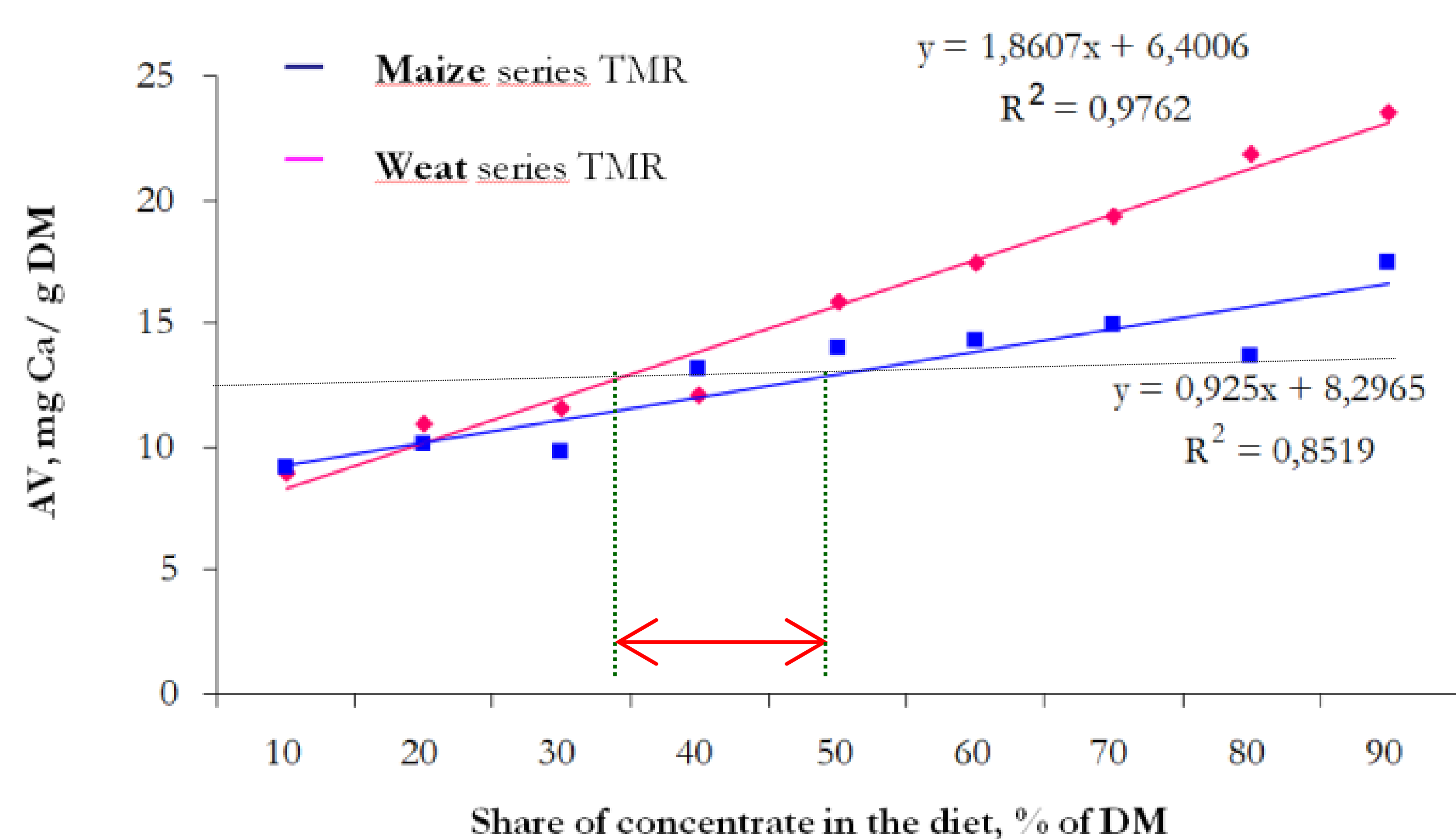


Figure 2. Relationship between acidogenicity (AV) and the share of concentrate in the diet

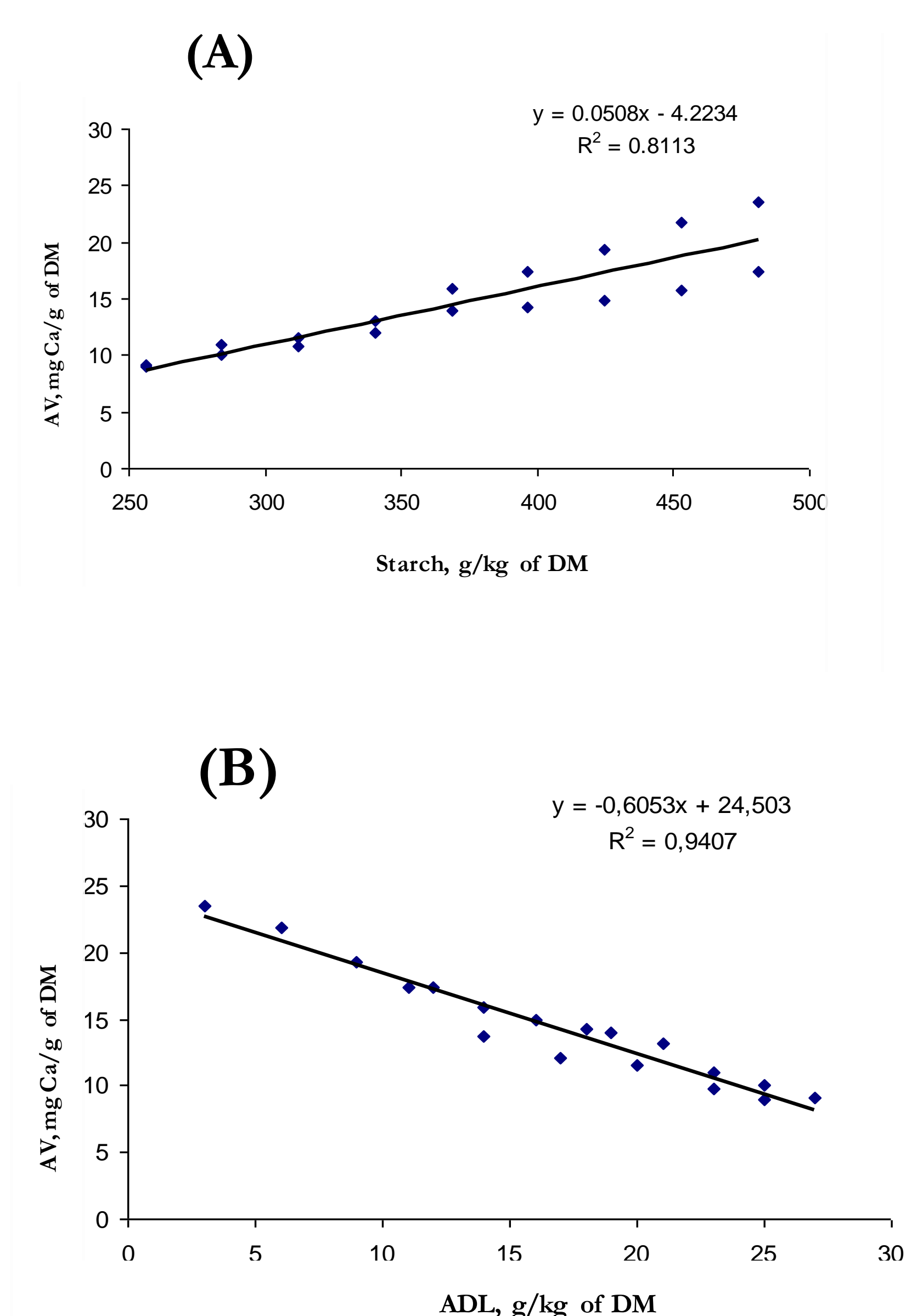


Figure 3. Relationship between acidogenicity (AV) and the content of starch (A) or ADL (B) in the diet

Contact



Piotr Micek
Department of Animal Nutrition and Biotechnology, and Fisheries
University of Agriculture in Krakow, Poland
E-mail: p.micek@urk.edu.pl

