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Nutritive effect of protein composition and other grain properties of doubled haploid wheat lines with/without translocation 1B/1R in a model feeding test

Dvořáček V., Kodeš A., Stehno Z., Hučko B., Mudřík Z.:

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[fulltext]

The frequent presence of rye translocation 1B/1R in common wheat is well known as well as its unfavourable effect on bread-making quality. These translocated materials make up more than

one tenth of all wheat varieties registered in the Czech Republic and due to their lower technological value they are predominately used for livestock feeding in spite of the lack of information about their desirability for monogastric animals. Our study was aimed at a general effect of 1B/1R translocation, including other grain characteristics in model feeding tests with laboratory rats. Triennial evaluation of selected chemical and technological characteristics of winter wheat grain, including feeding characteristics in the model set of 18 DH lines with/without 1B/1R translocation, confirmed a highly significant effect of year on evaluated parameters. Wheat lines with the presence of 1B/1R translocation showed a significantly higher value of relative viscosity, crude protein content and higher proportion of the albumin + globulin fraction. This was manifested negatively in the technological characteristics of the gluten index (GI) and the Zeleny sedimentation test of these wheat lines. Detected values of relative viscosity, grain hardness (PSI) and albumin-globulin fraction were significantly influenced by the genotype of

the wheat line. The relationships of evaluated grain characteristics to the results of feeding test were not unequivocal. The presence of 1B/1R translocation significantly decreased the values of balance in these characters: net protein utilization (NPU) and biological value of proteins (BV), however the effect of the 1B/1R translocation on protein efficiency ratio (PER) was not confirmed. Correlation analyses showed low mutual relationships among the parameters of balance and growth tests. A lower but significant positive correlation of the albumin + globulin fraction and a negative correlation of storage proteins with growth parameter PER were also observed. It is possible to summarize that individual relation between albumins + globulins and gluten protein composition of grains influenced the values of PER more significantly than the presence of 1B/1R translocation.

Keywords:
common wheat; 1B/1R translocation; protein fractions; nutritive value; model feeding test

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