Feeding suitability of *Festulolium* grass hybrids in cattle nutrition

Key words: *Festulolium*, feeding suitability, cattle

The presented studies were aimed to compare the feeding suitability of the most common *Festulolium* hybrids in Europe and comprehensively assess, in relation to hybrid ryegrass, the yield and chemical composition of grass, their suitability for ensiling, as well as assessing the production potential of beef and milk from *Festulolium* hybrids, taking into account selected quality parameters of obtained meat and milk. Research hypotheses about the influence of the *Festulolium* hybrids on its feeding suitability, yield and nutritional value, and the possibility of replacing some *Festulolium* hybrids with cheaper hybrid ryegrass were verified.

Under production conditions, four experimental plantations were established in 2017-2019 (*Festulolium*: Felopa, Perun, Lofa and hybrid ryegrass of the Gala variety). The amount of grass yielding, their chemical composition, nutritive value and suitability for ensiling were determined. Silage in bales was produced and their feeding suitability was assessed in two nutritional experiments carried out on Polish Holstein-Friesian black-and-white (PHF) bulls used for meat (Experiment I) and on PHF dairy cows (Experiment II).

It was found that all the analyzed grasses were characterized by a high nutritional value, the *Festulolium* hybrids had a slightly higher energy value in relation to the hybrid ryegrass and a higher protein value, except for the Perun. This hybrid surpassed other grasses in its suitability for silage. The assessed grasses allowed to obtain a very high yield of DM, net energy and total protein, with the Perun hybrid being the most efficient. The produced silages were characterized by an extensive fermentation process with a high level of lactic acid and a relatively low level of ammonium nitrogen and volatile fatty acids (VFA). The desired fermentation process is confirmed by the DLG scores. The silage made from all *Festulolium* hybrids had a higher energy value than silage from hybrid ryegrass. In assessing the quality of protein the CNCPS, the protein from hybrid ryegrass silage was better compared to the protein from *Festulolium* silage. The least favorable protein composition was found in silage from the Perun. *Festulolium* silage was characterized by a higher content of polyunsaturated fatty acids (PUFA), which was associated with a higher proportion of α-linolenic acid.

Studies carried out on young fattening cattle did not show any effect of the type of grass silage used in the diet, fed in the proportion of 70:30 with crushed barley grain, on the uptake of nutrients and the digestibility of the rations. However, its effect on the intake of digestible

ingredients was found. Differentiated nutrition did not result in differences in body and carcass weight gains and slaughter yield. The feed ration with *Festulolium* silage of the Lofa hybrid was characterized by the best feed conversion ratio (FCR). Silage from *Festulolium* Felopa hybrid turned out to be the most effective in terms of beef production per 1 hectare of cultivated grass (1.424 kg·1 ha^{-1}), although it was not characterized by either the highest dry matter yield or the best fodder conversion ratio. All bulls had a high content of intramuscular fat (IMF) in the *longissimus thoracis muscle* (7.27-10.05%). A higher content of PUFA was found in the IMF of bulls fed silage made of hybrid ryegrass, and a more favorable n-6/n-3 PUFA ratio was found in the group fed with *Festulolium* silage of the Lofa hybrid.

The use of silage with *Festulolium* in the diet of dairy cows, compared to silage from hybrid ryegrass, resulted in higher milk yield and protein production (kg·day^{-1}). The silage produced from the Lofa hybrid resulted in the highest ECM yield index, while the Felopa hybrid had the highest FCR index. The effect of the grass silage on the composition and physicochemical properties of milk was not confirmed, but a positive effect of feeding cows with *Festulolium* silage of the Felopa on the content of α-linolenic acid, CLA and the share of n-3 acids in milk fat was noted.

Based on the results obtained in this dissertation regarding the yield and fat composition of milk and meat, it should be concluded that the *Festulolium* hybrid most recommended for silage production is the Polish hybrid Felopa. The high nutritional value of *Festulolium* fodder indicates the need to evaluate hybrids on animals with maximum production potential, i.e. cows up to 100 days of lactation and bulls in the early fattening phase. The beef production rate per 1 ha turned out to be the most reliable way to assess the fodder suitability of grasses for fattening.