THE QUALITY INDICES OF FODDERS FROM SOME COMMON MILLET CULTIVARS (*PANICUM MILIACEUM*) UNDER THE CONDITIONS OF THE REPUBLIC OF MOLDOVA

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Introduction

Climate change-associated environmental stresses, such as extreme temperatures, lack of precipitation or erratic rainfall during the growing season will compromise the ability of agriculture to meet the food demands of an increasing global population. Diversifying crop production by including neglected and underused crops, as well as the domestication of new species would provide a solution to many of the problems associated with climate change resilience, food security, forage production, feedstock energy biomass and other industrial needs. The genus *Panicum* L. belongs to the family *Poaceae*, with nearly 450 species of annual or perennial grasses occurring throughout tropical and warm temperate regions of the world, is an important group of plants for agriculture and horticulture due to their economic significance and ornamental value. Common millet or proso millet, *Panicum miliaceum* L., is one of the world's oldest cultivated crops, and has also been cultivated in our region. It is a short growing, summer season crop (60 to 100 days) with unique agronomic properties such as high tolerance to heat and drought conditions. *Panicum miliaceum* could be a viable alternative to main summer forages in areas where cultivation of corn or Sudan grass is restricted because of a longer growing season or poor agricultural conditions (Tan et al., 2016; Tran, 2017; Maksimova et al., 2019; Dağtekin et al., 2020; Wei et al., 2022; Stybayev et al., 2023).

The goal of this research was to evaluate the quality indices of the harvested green mass, prepared silage and hayfrom common millet, *Panicum miliaceum*, for feeding farm animals.

MATERIALS AND METHODS

The cultivars of common millet *Panicum miliaceum:* 'Soiuz' created at the at the "Selectia" Research Institute of Field Crops Bălți, Republic of Moldova and 'Marius' created at the National Agricultural Research and Development Institute Fundulea, Romania, cultivated in the experimental plot of the National Botanical Garden (Institute) "Alexandru Ciubotaru", Chişinău, served as subjects of the research.

The plant samples were collected in flowering stage. The harvested plants were chopped into 1.5-2.0 cm small pieces, with a laboratory forage chopper, the dry matter content was detected by drying samples up to constant weight at 105° C. The silage was prepared from chopped green mass, compressed in well-sealed glass containers, stored at ambient temperature (18-20° C). After 45 days, the containers were opened, and the sensorial and fermentation indices of the conserved forage were determined in accordance with standard laboratory procedures – the Moldavian standard SM 108*. The prepared hay was dried directly in the field. For biochemical analysis, the plant samples were dried in a forced air oven at 60° C, milled in a beater mill equipped with a sieve with diameter of openings of 1 mm and some assessments of the main biochemical parameters: crude protein (CP), ash, acid detergent fibre (ADF), neutral detergent fibre (NDF), acid detergent lignin (ADL), total soluble sugars (TSS), digestible dry matter (DDM), digestible organic matter (DOM) have been determined by near infrared spectroscopy (NIRS) technique PERTEN DA 7200. The concentration of hemicellulose (HC), cellulose (Cel), digestible energy (DE), metabolizable energy (ME), net energy for lactation (NEl) and relative feed value (RFV) were calculated according to standard procedures.

***Panicum miliaceum:* 'Soiuz'** **_Panicum miliaceum:_ 'Marius'**

RESULTS AND DISCUSSIONS

Table 1. **Some biological peculiarities and the productivity of the studied common millet cultivars *Panicum miliaceum***

Cultivar	Plant height, cm	Stem, g		Leaf + panicle, g		Total weight of a shoot, g		Yield, kg/m²		Content leaves+ panicles in fodder, %
		fresh mass	dry matter	fresh mass	dry matter	fresh mass	dry matter	fresh mass	dry matter	
SOIUZ	84	14.7	3.2	14.6	3.5	29.3	6.7	35.9	8.2	52.2
MARIUS	120	19.3	3.9	15.2	3.9	34.5	7.8	46.9	10.6	50.0

Table 2. **The biochemical composition and nutritional value of fresh mass from studied millets cultivars**

Indices	SOIUZ	MARIUS
Crude protein, g/kg DM	132	108
Crude fibre, g/kg DM	352	372
Minerals, g/kg DM	101	98
Acid detergent fibre, g/kg DM	372	389
Neutral detergent fibre, g/kg DM	608	642
Acid detergent lignin, g/kg DM	39	38
Cellulose, g/kg DM	333	351
Hemicellulose, g/kg DM	236	253
Total soluble sugars, g/kg DM	124	117
Digestible dry matter, g/kg DM	599	586
Relative feed value	92	86
Digestible energy, MJ/ kg DM	11.86	11.62
Metabolizable energy, MJ/ kg DM	9.73	9.54
Net energy for lactation, MJ/ kg DM	5.75	5.56

Table 3. **The biochemical composition and nutritional value of hay from studied millets cultivars**

Indices	SOIUZ	MARIUS
Crude protein, g/kg DM	132	91
Crude fibre, g/kg DM	368	408
Minerals, g/kg DM	104	87
Acid detergent fibre, g/kg DM	386	419
Neutral detergent fibre, g/kg DM	629	682
Acid detergent lignin, g/kg DM	38	39
Cellulose, g/kg DM	348	380
Hemicellulose, g/kg DM	243	263
Total soluble sugars	93	94
Digestible dry matter, g/kg DM	588	563
Relative feed value	87	86
Digestible energy, MJ/ kg DM	11.66	11.21
Metabolizable energy, MJ/ kg DM	9.57	9.20
Net energy for lactation, MJ/ kg DM	5.59	5.22

Table 4. **The biochemical composition and nutritional value of silage from studied millets cultivars Panicum miliaceum**

Indices	SOIUZ	MARIUS
pH index	4.06	3.97
Organic acids, g/kg DM	32.5	35.2
Free acetic acid, g/kg DM	2.0	1.8
Free butyric acid, g/kg DM	0	0.1
Free lactic acid, g/kg DM	10.6	11.4
Fixed acetic acid, g/kg DM	1.6	2.3
Fixed butyric acid, g/kg DM	0.3	0.2
Fixed lactic acid, g/kg DM	18.0	19.4
Total acetic acid, g/kg DM	3.6	4.1
Total butyric acid, g/kg DM	0.3	0.3
Total lactic acid, g/kg DM	28.6	30.8
Acetic acid, % of organic acids	11.1	11.6
Butyric acid, % of organic acids	0.9	0.8
Lactic acid, % of organic acids	88.0	87.6
Crude protein, g/kg DM	116	109
Crude fibre, g/kg DM	347	389
Minerals, g/kg DM	103	111
Acid detergent fibre, g/kg DM	360	407
Neutral detergent fibre, g/kg DM	620	660
Acid detergent lignin, g/kg DM	26	29
Cellulose, g/kg DM	334	378
Hemicellulose, g/kg DM	260	253
Total soluble sugars	121	96
Digestible dry matter, g/kg DM	609	572
Relative feed value	91	81
Digestible energy, MJ/ kg DM	12.03	11.37
Metabolizable energy, MJ/ kg DM	9.87	9.34
Net energy for lactation, MJ/ kg DM	5.89	5.35

CONCLUSIONS

The local common millet cultivar '*Soiuz'* is distinguished by a faster pace of development, lower plant height and dry matter productivityy, but prepared fodders have high content of crude protein and lower content of structural carbohydrates.

The studied romanian common millet cultivar *'Marius'* is characterized by long vegetative period, high dry matter productivity, optimal minerals, crude protein and fibres contcentration. The studied common millet cultivars can be used in monoculture or as a component of the mix of annual legume crops, and the harvested mass may be used as forage for livestock as natural fodder, hay, silage

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