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THE ROLE OF GRASS-ROOT HERBS IN THE CREATION OF CEREAL HERBAGES WITH DIFFERENT RIPENING PERIOD

The increasing production of competitive livestock products, particularly meat cattle breeding production is not possible without the development of quality forage base. In the structure of beef cattle, feeding with green forage in summer-autumn period must be at least 60-70%. The cheapest forage is herbal feed, in particular pastures. Therefore, they are the basis of profitable production in meat cattle breeding. In this context extremely important for beef cattle, as the least demanding to forage and maintenance, is lengthening of the grazing period. Previous studies [2, 4] and the foreign experience give reason to believe, that by creating backup units it is possible to extend grazing period up to 60, and under favorable weather conditions up to 90 days until snowfall in late autumn. Among the types of forage grasses, special place is given to grass-roots cereals, which are well preserved in autumn period, resistant to frost, provide high performance of cenoses and significantly improve the quality of forage.

The purpose of research. Determine the role of grass-root herbs in the creation of cereal herbages with different ripening period, develop the technological bases of prolonged green conveyer for beef cattle.

Terms and method of research. Research of the grass-root herbs role of in the creation of cereal herbages with different ripening period for beef cattle was conducted in field experiment at the research facility of NSC "Institute of agriculture NAAS"- "Chabany", Kyevo-Sviatoshynsky district, Kyiv region.

Field experiments started in 2007 on land with proper humidification and gray forest soil, which contained 1,7% of humus

in 0-20 cm layer, 8,3 mg of Nitrogen per 100 g of dry soil, 17,5 mg – P_2O_5 and 9,8 mg – K_2O. The soil belongs to slightly acid – pH saline – 5,5, hydrolytic acidity – 1,3 mEq./100 g of soil. The depth of humus horizon is 90 cm. The occurrence of groundwater is observed below 3m. Terrain – flat. Meadowing of research sites conducted in early spring without cover. Mineral fertilizers were applied like common background: phosphate and potash fertilizers in the form of granular superphosphate, potassium salt and potash - in one period in the spring; nitric fertilizers (ammonium nitrate) - in three periods in spring and after the first and second mowing. The first and second mowing conducted in earing and early flowering phase of dominant cereal grass species. Third mowing planned for cattle pasturing. The size of the cultivated area in experiment – 21 m^2, accounting area – 15 m^2. Repeated four times. The scheme of the experiment is shown in the result tables of studies.

For research were used conventional methods, in particular, laboratory and field [1, 3, 5, 6, 7].

Research results. The results of research during the 2008-2015 about evaluation of the role of grass-roots grasses (red fescue) in improving the stability of seeded grass herbage with different ripening period to ensure conveyor production of high quality grass forage during the growing period was characterized by objective diversity in years, depending on species composition and fertilizers, regimes of agrocenoses usage, weather and climatic conditions.

It is found, that due to many-mowing usage in the main block of prolonged forage conveyer, continuous income of green fodder in the period from May 15 to October 1, ensures the herbages with different ripening period with the dominance of Dactylis glomerata in early-ripening, Bromus inermis in mid-ripening, Phléum praténse L. and Elytrigia intermedia in late-ripening. Terms of herbage exclusion during research was determined by development of dominant components of grass mixtures and the climatic conditions of the year.

Variation of harvesting dates was within 4-16 days (table 1). Development and harvesting dates for herbage, especially in first cycle was dedicated to spring beginning, which was rarely at the end of March, and more often after April 8. Plant vegetation in 2014 begun from March 24, in 2013 – from April 9, 2011 – from April 6. Density

and height of herbages depended primarily on seasonal development of dominant components. By mid-May herbages with early-ripening basically reached the phase of earing. Difference in ripening terms between early and mid-ripening herbages in first cycle was 9-14 days, and between early and late-ripening – 17-23 days, in second mowing respectively 11-17 and 16-28 days and in third period – 12-18 and 29-31 days. Since the best agro technical harvesting period for herbs of similar ripening term is averaging about 10 days, existence of different herbages in grass conveyor can extend optimal period for harvesting herbs in first mowing an average of 32 days, in second – up to 37 and in third – to 44 days. This creates favorable conditions not only to reduce crop losses and improving of its quality, but also for the rational use of human resources and harvesting machinery in conveyor forage production system. The forth cycle of herbage usage takes place in late autumn, that's why it is unstable in years. Highest yields are in cereal grass mixtures with early and mid-ripening periods.

Table 1. Harvesting dates for cereal herbages with different ripening period (average for similar herbages 2008-2014)

Herbage type by ripening period	Usage cycles			
	1st	2nd	3nd	4th (latter growth)
early-ripening	15.05-28.05	1.07-14.07	14.08-29.08	15.09-5.10
mid-ripening	25.05-10.06	10.07-31.07	26.08-15.09	20.09-15.10
late-ripening	2.06-21.06	15.07-12.08	11.09-28.09	9.11-16.11

Key role in yield formation of early-herbages belong to Dactylis glomerata and Festuca pratensis Huds in first 3 years. At the middle of April, Dactylis glomerata starts to tillering, and from April 22-24 begun booting phase. Due to active growing at the early spring and to good tillering Dactylis glomerata fast spread in mixtures, that's why its contents was more than 80%, except 1-2 years of grass mixture vegetation, and total content of cereals was more than 90-94% (Table 2). This plant was well held in herbage during all years of usage. All this indicates about its durability, plasticity and resistance to adverse weather conditions. Dynamic development of early herbages

improved also by spreading of Festuca rubra L., which took up to 11% in mixtures in certain years. Effect of Festuca pratensis Huds on development of early grass mixtures after 3 years of vegetation was insignificant.

In grass mixtures with mid-ripening period key role in yield formation during first 3 years belongs to Bromus inermis (52%) and Festuca pratensis Huds (34%), after that – Bromus inermis and Festuca rubra L. Festuca pratensis Huds begin to disappear on 3-rd year of vegetation. At the 8 year of mixture usage total amount of cereals was up to 60-76%, depending on grass mixture content. Festuca rubra L. in mid-ripening mixtures was up to 15%.

In late-ripening herbages Elytrigia intermedia was dominant – up to 68%, Phléum praténse L. – 39%, Festuca rubra L. – 19-28%.

The biggest attenuation in 8 years of grass vegetation was in herbage with content of Phléum praténse L. as dominant crop (cereal content 39-52%, Phléum praténse L. – 32%), especially significant it was at August, when precipitation was not enough for plant development, and air temperature was higher than 30 – during the day.

Experimental data have shown, that in a northern Forest-Steppe zone performance of cereal herbages with introduction of $N_{120\,(40+40+40),}$ the average for the years (2008-2015) was within 5,02-6,75 t/ha of dry matter. The biggest performance over the years was shown by grass mixture with dominant Dactylis glomerata and Elytrigia intermedia, while in 2015 – Bromus inermis and Dactylis glomerata. Yield of grass mixtures green mass was 23,8-25,1 t/ha. Slightly lower yields were in mid-ripening mixtures (21,9-23,2) and late-ripening – 18,5-23,4 t/ha.

Because of Festuca rubra L. including in herbages, was observed the reliable increase of harvest by 1-1,5 tons of green mass, more significant increase was in late-maturing herbage with Phléum praténse L. and Elytrigia intermedia.

Table 2. Productivity of cereal herbages with different ripening periods, t/ha (average 2008-2015)

Species, grass varieties and seeding rates, kg/ha	Green mass yield, t/ha	Dry matter, t/ha	Forage units, t/ha	Crude protein, t/ha	Cereal content (8-th year of vegetation) %
Early-maturing herbage					
Dactylis glomerata –12 + Festuca pratensis Huds – 4	23,8	6,44	4,35	0,94	81
Dactylis glomerata –12 + Festuca pratensis Huds – 4 + Festuca rubra L.– 8	25,1	6,75	4,60	0,97	88
Mid-maturing herbage					
Bromus inermis – 16 + Festuca pratensis Huds – 4	21,9	5,88	3,91	0,85	60
Bromus inermis – 16 + Festuca pratensis Huds – 4 + Festuca rubra L.– 8	23.2	6,31	4,28	0,92	76
Late-maturing herbage					
Phléum praténse L. – 12 + Festuca pratensis Huds – 4	18,5	5,02	3,38	0,68	39
Phléum praténse L. – 12 + Festuca pratensis Huds – 4 + Festuca rubra L.– 8	21,3	5,61	3,87	0,79	52
Elytrigia intermedia – 18 + Festuca pratensis Huds – 4	22,0	5,78	3,92	0,79	48
Elytrigia intermedia – 18 + Festuca pratensis Huds – 4 + Festuca rubra L.– 8	23,4	6,30	4,33	0,95	68
$LSD_{0.5}$	0,46	0,24			

On the average for all years of study, Festuca rubra L. inclusion in these herbages helps to improve their durability, resistance, late growth and increase productivity by 5-10% , which is very important to extend the green conveyor.

During the years of studies (2008-2015), largest gathering 4,35-4,60 t/ha of fodder units and 0,94-0,97 t/ha of crude protein provided by early-maturing grass cenoses. Late-maturing grass cenoses due to the deterioration of its botanical composition provided somewhat lower productivity.

Table 3 . Pasture productivity of cereal herbages with different ripening period with the inclusion of grassroots grasses in the autumn, t/ha (average 2008-2015)

Species, grass varieties and seeding rates, kg/ha	Green mass yield, t/ha	Dry matter, t/ha	Forage units, t/ha	Crude protein, t/ha	Cereal content (8-th year of vegetation) %
Early-maturing herbage					
Dactylis glomerata –12 + Festuca pratensis Huds – 4	2,6	0,84	0,53	0,12	-
Dactylis glomerata –12 + Festuca pratensis Huds – 4 + Festuca rubra L.– 8	2,9	0,89	0,54	0,13	8
Mid-maturing herbage					
Bromus inermis – 16 + Festuca pratensis Huds – 4	2,3	0,75	0,46	0,11	-
Bromus inermis – 16 + Festuca pratensis Huds – 4 + Festuca rubra L.– 8	2.7	0,84	0,52	0,12	15
Late-maturing herbage					
Phléum praténse L. – 12 + Festuca pratensis Huds – 4	1,6	0,53	0,37	0,08	-
Phléum praténse L. – 12 + Festuca pratensis Huds – 4 + Festuca rubra L.– 8	2,2	0,74	0,44	0,10	27
Elytrigia intermedia – 18 + Festuca pratensis Huds – 4	2,1	0,63	0,48	0,10	-
Elytrigia intermedia – 18 + Festuca pratensis Huds – 4 + Festuca rubra L.– 8	2,6	0,83	0,57	0,12	18
$LSD_{0.5}$	0,16	0,05			

The role of grass-root herbs in the creation of cereal herbages with different ripening period significantly increases in autumn period. Very effectively responds to humidification in autumn periods Festuca rubra L. Therefore, productivity of cereal cenoses with inclusion of grass-root herbs in early-maturing herbage was by 8-11, mid-mature by 9-15, late-mature by 19-28% higher, than in cenoses without Festuca rubra L. (Table 3). Productivity of pasture cenoses

in autumn, in some years was low, because of drought, and in best variants with N_{40} background was more than 1 t/ha of dry matter with 12-14% of crude protein. High moisture and air temperature in autumn allows the use of cereal herbage as pastures effectively almost till December.

Conclusions. Inclusion of grass-root herbs in herbages with different ripening period (Festuca rubra L.) helps to improve their durability, resistance and imrove their total annual productivity by 5-12%. Productivity of early-maturing herbages as pastures with inclusion of grass-root herbs in autumn period increase by 8-11, mid-maturing – by 9-15, late-maturing – by 19-28%.

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У статті висвітлено результати досліджень з вивчення впливу низових трав (костриці червоної) на формування і продуктивність різностиглих злакових травостоїв. Наведено дані з ефективності включення низових трав до різностиглих злакових травостоїв при пасовищному їх використанні в осінній період.

Ключові слова: *злакові трави, різностиглі травостої, низові трави, травосуміші, цикли використання, продуктивність, пасовищні ценози, отавність.*

В статье изложены результаты исследований по изучению влияния низовых трав (овсяницы красной) на формирование и продуктивность

разноспелых злаковых травостоев. Приведены данные с эффективности включения низовых трав до разноспелых злаковых травостоев при их пастбищном использовании в осенний период.

Ключевые слова: *злаковые травы, разноспелые травостои, низовые травы, травосмеси, циклы использования, продуктивность, пастбищные ценозы, отавность.*

The article reflects the results of studies investigating the influence of grassroots herbs (Festuca rubra L.) on the formation and productivity of grass herbage. Inclusion of grass-root herbs with different ripening period helps to improve herbage durability, resistance and imrove total annual productivity. Shown high productivity of herbages as pastures with inclusion of grass-root herbs in autumn period. Among the types of forage grasses, special place is given to grass-roots cereals, which are well preserved in autumn, resistant to frost, provide high performance of cenoses and significantly improve the quality of forage.

Keywords: *grass-root herbs, herbages, grass mixtures, cycles of the use, productivity, after-grass ability.*

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