

демек күздік бидайдың даму кезеңінде өсуінің негізгі дәуіріне сәйкес шартты таза табыс көлемі артып отырды, ал күздік бидай өсірудің бақылау нұсқасында өндірілген астық дәнінің өзіндік құны (3537 теңге / ц) деңгейінде қалыптасты, ал қолданылған өскін үдеткішпен микротиңайтқыш өндірілген астықтың өзіндік құнын (2759-2968 теңге/ц) төмендете отырып, шартты түрде таза табыс деңгейін арттыруға оң ықпал етті. Айта кету керек, күздік бидай тұқымының өзіндік құны 2021 жылмен салыстырғанда айтарлықтай төмен, бұл нәтиже 2022 жылы қалыптасқан қолайлы ауа райына сәйкес астық өнімділігінің жоғарылауымен байланысты.

"Биобарс М" биотыңайтқыштарын қолдану кезінде шартты түрде таза кірістің мөлшері 135,2-195,4 мың теңге/га деңгейінде болғанын атап өткен жөн, бұл бақылау нұсқасымен салыстырғанда 1,4-2,1 есе жоғары, бірақ өскін үдеткіші мен микротиңайтқыштар қолданылған ең жақсы нұсқамен салыстырғанда біршама төмен қалыптасты.

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CONSTRUCTION OF A SCHEME FOR THE USE OF FODDER CROPS FOR THE DRY STEPPE ZONE OF KAZAKHSTAN

ANNOTATION

Pasture keeping of farm animals in the conditions of the dry steppe zone is a labor-intensive process. To provide stable animals with feed, we have developed the structure of a hay-pasture conveyor. This method is based on the use of forage crops, scientifically based selection of species composition, productivity level, direction of economic purpose. The developed composition uses mixtures of perennial herbs consisting of granary, esparcet and alfalfa, and also uses seeds of Sudanese grass, fodder sorghum. The main attention is drawn to the fact that the crops of Sudanese grass are mown in the "tubing - earing" phase. To obtain a good grass of the Sudanese grass, mowing was carried out at a height of 10-12 cm in the phase of throwing out the panicle. The sowing of fodder sorghum for green fodder was carried out in the second decade of May, since the warm period favorably affects the increase in vegetative mass. In the panicle phase, forage sorghum is recommended to be drained in October-November, and in warm winter conditions it is used as a winter pasture. At the end of the pasture season, the autumn cold comes. During this period, the animals return to the pens again, where feeding is carried out with harvested hay. The developed structure of the hay-pasture conveyor allows for a long time to receive pasture feed and increase the pasture period by 90-95 days due to the presence of annual and perennial grasses in the scheme. The haymaking and pasture conveyor is strongly influenced by weather and climatic conditions, under favorable conditions it is possible to obtain from a unit area from 113.7 to 125 c/ha of pasture grass green mass. By the fifth year, the productivity of the mixture of perennial grasses decreases, it is proposed to use the grasses of the second and third years of use as hay, and the fourth and fifth years for grazing, the feed value is from 0.46 to 0.56 fodder units.

Key words: *perennial herbs, wheatgrass, sainfoin, alfalfa, pastures, feeding value*

Introduction. To the problem of fodder production for the conditions of the arid steppe of Western Kazakhstan with an annual rainfall of 250-300 mm, a method of using forage crops of a hay-

pasture conveyor based on a grass-field crop rotation is proposed. Therefore, research aimed at finding ways to preserve the productive longevity of arid pasture ecosystems is relevant [1]. Compliance with the hay pasture turnover and the use of paddock grazing allows you to maintain the productivity of improved and old-sown forage lands, and the developed modes of their use in the hay-pasture system ensure continuous grazing of animals and obtaining high-quality hay [2].

As a result of intensive grazing and constant trampling of agricultural land by cattle, there is a massive loss of valuable grasses and legumes from grass stands and the settlement of most areas with low-value coarse-stemmed plants and other weeds. These lands are subject to degradation and a decrease in yield to 1-5 kg / ha. In addition, in the dry-steppe zone of Western Kazakhstan, there are mainly tipchak-kovyl, tipchak-sagebrush types of pastures that burn out in the second half of summer [3,4,5]. It is recommended to graze animals until the end of May on natural pastures after the grass has already become coarse, by this time the grass on the sown pasture enters the phase of tillering of cereals and gives the largest and most nutritious pasture mass. From the ripeness phase, the granary becomes coarse and poorly eaten from this period, it is necessary to tint the untreated remains of cereal perennial grasses to obtain otava. In more favorable years for hydration, the grass of perennial grasses can be used for repeated bleaching by animals. A grass mixture of alfalfa, esparcet and granary should be grazing in earlier phases of its development, when the herbage contains a large amount of nutrients and is well eaten by cattle [6,7,8,9,10,11].

The method of using forage crops based on the selection of mowing maturity dates can be used for pasture and stable keeping of livestock, which is achieved by sowing a mixture of perennial cereals and legumes forage grasses, as well as annual crops adapted to the soil and climatic conditions of the dry-steppe zone of West Kazakhstan [12,13,14,15,16,17,18].

To improve or create cultivated hayfields and pastures on unproductive saline, degraded lands, it is best to use grass mixtures with the mandatory inclusion of alfalfa, esparcet and yellow clover in the components of legumes [19,20,21].

Material and methods of research. All agrotechnological measures were carried out at the hospital of "Non-irrigated agriculture and forage production" LLP "Ural Agricultural Experimental Station" in the grass-field crop rotation: a mixture of perennial grasses 1-5 years of life, Sudan grass, sorghum fodder. Sowing of a mixture of perennial grasses was carried out with a NWT-3.6 seeder in a semi-covered way, barley was used as a semi-covered crop, crops of Sudan grass and sorghum were carried out with a SZS-2.1 seeder, according to the norms recommended for the dry-steppe zone.

Cleaning in the experiments was carried out with a small-sized combine "Wenterhtaiger". Productive is reduced to standard humidity and 100% purity.

Statistical processing of the obtained evidence was carried out by the method of variance analysis [22].

Results and discussion. The soil cover of the experimental site is represented by dark chestnut carbonate soil. The content of physical clay in the profile varies from 54.10 to 61.06%. The 0-23 cm soil layer contains the smallest amount of fine particles. The water-physical properties of the soil indicate its high moisture storage capacity, while the upper arable layer (0-30 cm) has the greatest moisture capacity.

The soils of the site are characterized by a neutral environment, medium availability of mobile forms of phosphorus, nitrogen and high – potassium. The amount of absorbed bases in the upper layer is 30-34 mg. eq/100 g of soil and gradually decreases with depth. Calcium dominates among the exchange cations. The maximum of absorbed potassium is closer to the surface horizon, and sodium is at a depth of 95-100 cm.

In the autumn, following the harvesting of spring crops, a chill treatment was carried out. Spring harrowing as the soil ripens. In summer, all processing is aimed at keeping the field clean, the top layer of the soil in a loose state by cultivation to a depth of 6-7cm, as much as possible to accumulate and retain moisture in the soil.

The analysis of the course of precipitation amounts in connection with the yield of major crops was carried out according to published evidence from the Ural Hydrometeorological Station and data from the Department of Agriculture of the Western Kazakhstan region. The temperature regime in April, May and June remained at the level of the average annual evidence (Figure 1).

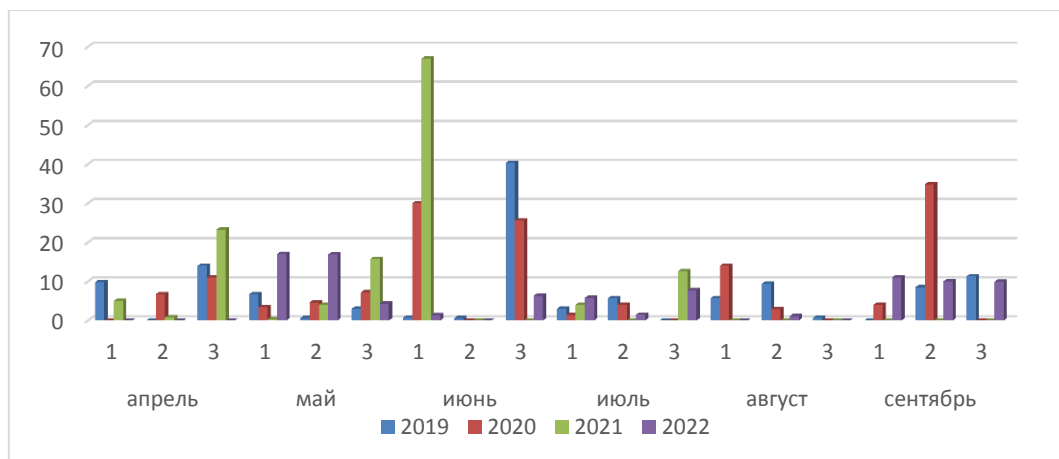


Figure 1 – The amount of precipitation over the decades of the warm period

The temperature regime of 2021 for the first months of the growing season (May, June) exceeds the norm in May by 34%, in June by 17%. The average daily temperature in May was 21.50 °C with a norm of 16.0 °C, in June 24.50 °C versus 20.90 °C according to long-term evidence.

The stressful situation was improved by a multi-day rain that took place at the end of May. From May 30 to June 4, 81 mm of precipitation fell in 6 days, determining the moisture reserves in the 0-100 cm soil layer at the level of 120 mm, which contributed to the formation of secondary plant roots crop productivity. However, the subsequent continuous air drought led to a loss of moisture in the soil. In June, there was a continuous drought for 25 consecutive days with daytime temperatures from 33.5 to 41.8 °C, on the soil of 50-55 °C. From June 15 to June 30, the average daily air temperature was 28.8-31.9 °C with a long-term norm of 20.9 °C. Rainfall during this period did not fall at all. Thus, the recruitment (formation) of the vegetative mass of winter triticale took place in extreme conditions of atmospheric and soil drought. In the month of July, the situation has changed little. The average daily temperature was 25.1 °C with a norm of 22.9 °C. Precipitation fell only 17 mm with a norm of 40 mm. There was no precipitation at the end of July, beginning of August, the average daily temperature was 28.2 – 29.5 °C with multi-year data of 22.9-21.2 °C. Daytime temperatures reached 38-42 °C. The deviation of the average daily temperature in July was +2.2 degrees, in August +4.9 degrees. The cold snap began only in September: the average daily temperature is 22.5 °C. Precipitation for 20 days fell 15 mm with a monthly norm of 29 mm.

In April 2022, the average daily air temperature was +11.60 °C, which is 3.50 °C higher than the average long-term data (norm +8.1 °C). The maximum air temperature was +20.9 °C, the minimum +3.4 °C. Precipitation fell 22.0 mm, which showed the norm for long-term averages (norm 22.0 mm). The average daily humidity for the month was 72%. The first 2 decades were marked by precipitation, stable positive average daily temperatures, gusty winds. By the end of the third decade, an increase in average daily temperatures was noted. In the second decade, good precipitation and gusty winds were noted, an increase in temperature was noted compared to the first decade.

In May, the average daily air temperature was +12.4 °C, which is 3.6 °C higher than the average annual data (norm +16.0 °C). The maximum air temperature was +20.6 °C, the minimum +8.1 °C.

38.2 mm of precipitation fell, which is 10.2 mm higher than normal (the norm is 28.0 mm). The average daily humidity for the month was 64%.

The weather conditions of the first two decades of May were marked by gusty winds, temperature fluctuations during the day and at night, especially band precipitation in the second decade.

The third decade from the middle was characterized by high daytime temperatures, which reached +20.60 °C, precipitation fell in the form of rain and hail. By comparison to last year, the month of May was cooler, and with a high amount of precipitation.

Thus, the precipitation and weather conditions in May were favorable for the growth and development of winter and spring crops.

In June, the average daily air temperature was +20.9 °C, which is the same as the average long-term data (the norm is +20.9 °C). The maximum air temperature was +26.2 °C, the minimum +17 °C.

Precipitation fell 8.0 mm, which is below the norm by 25.0 mm (norm 33.0 mm). The average daily humidity for the month was 55%.

In the first and third decades, small precipitation of a cavity nature was noted, high temperatures were observed during the day and at night.

At the beginning of the third decade, high temperatures were noted, and by the end there was a noticeable decrease in temperature during the day and at night and no noticeable precipitation was observed.

In July, the average daily air temperature was $+23.2^{\circ}\text{C}$, which is 0.3°C higher than normal (the norm is $+22.9^{\circ}\text{C}$). The maximum air temperature was $+30.4^{\circ}\text{C}$, the minimum $+17^{\circ}\text{C}$. Precipitation fell 15.0 mm, which is lower than the average annual data by 25.0 mm (norm 40.0 mm). The average daily air humidity for the month was 55%.

Since the middle of the first decade, there has been a lack and then a weak manifestation (mainly of a hollow nature) of precipitation, gusty winds, high temperatures and the establishment of high temperatures during the day and night. In the fields, the oppression of agricultural crops from extreme heat was observed in the form of withering leaves and soil desiccation was noted in the areas of agricultural formations.

Small precipitation was observed until the middle of the third decade. The established consistently high temperature in the daytime and at night in the month of July led to abnormal heat and worsened the conditions for vegetation development, but favored harvesting.

In August, the average daily air temperature was 25.4°C , which is 4.3°C higher than normal (norm $+21.1^{\circ}\text{C}$). The maximum air temperature was $+37.00^{\circ}\text{C}$, the minimum $+10.00^{\circ}\text{C}$. Precipitation fell 1.1 mm, which is 25.9 mm lower than the average annual data (the norm is 27.0 mm). The average daily air humidity for the month was 37%.

The weather conditions of August were marked by low precipitation, abnormal heat, noticeable temperature differences during the day and at night. In the second decade, light precipitation was noted.

In September, the average daily air temperature in September was $+15.9^{\circ}\text{C}$, which is higher than the norm by $+1.4^{\circ}\text{C}$ (the norm is 14.5°C). The maximum air temperature was $+36.0^{\circ}\text{C}$, the minimum was 0°C . Precipitation fell 27 mm, which is 2 mm lower than the average annual data (the norm is 29 mm). The average daily humidity for the month was 60%.

The weather conditions of the two decades were marked by precipitation, gusty winds, significant differences in daytime and nighttime temperatures. The precipitation that fell in the first and second decades contributed to the moistening of the soil in the fields, favored the growth and development of winter crops.

In the third decade of September there were warm days without precipitation and day and night temperature differences.

In contrast to the previously proposed schemes, drought-resistant three-component grass mixtures of perennial cereals and legumes of different years of life (alfalfa + esparcet + granary) have been introduced into the crop set, which are used for mowing and bleaching in the pasture conveyor system according to the terms given in Table 1.

Table 1 – The scheme of use of fodder crops

Forage crops	Date	
	grazing	mowing
A mixture of perennial herbs 5 years of life	10.06-30.06	-
A mixture of perennial herbs 4 years of life	01.07-20.07	-
A mixture of perennial herbs 3 years of life	20.07-31.07	15.06-25.06
A mixture of perennial herbs 2 years of life	01.08-20.08	25.06-30.06
A mixture of perennial herbs of 1 year of life barley is a semi-covered crop	-	25.06-30.06
Sudan grass	20.08-30.09	15.07-20.07
Fodder sorghum	01.10- 30.11	-

Planning of the timing of grazing and mowing, calculation of the areas of sowing for a really possible yield is carried out taking into account the decadal needs of animals for pasture and stall feed.

The yield of three-component grass mixtures is shown in Figure 2. The most stable yield of coarse feed is a mixture of perennial grasses of the third year of life by the fifth year, productivity decreases, it is proposed to use grasses of the second and third years of use as haymaking, and the fourth and fifth years for grazing.

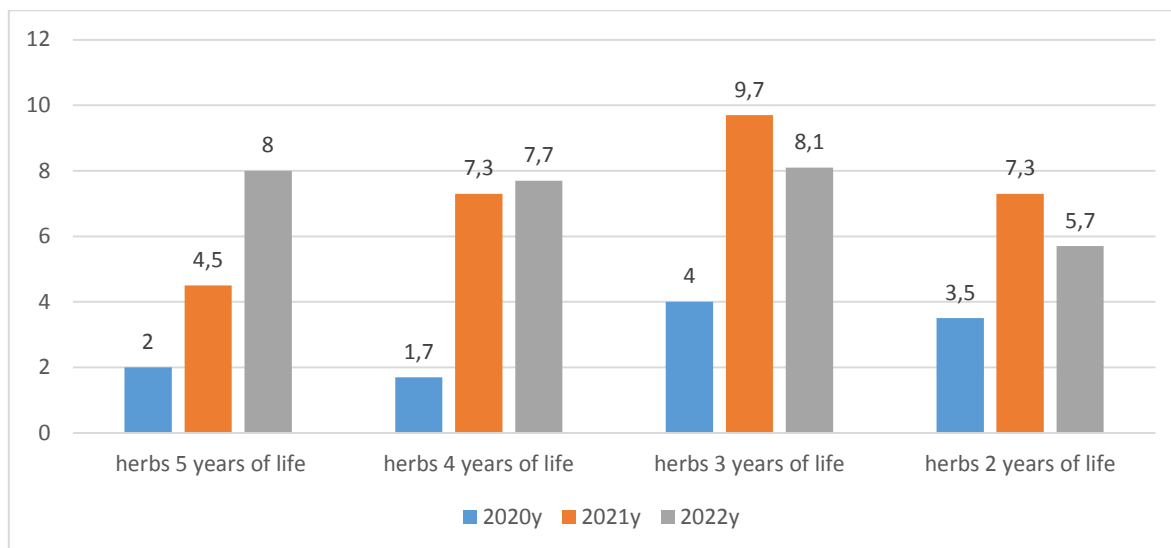


Figure 2 – Yield of a mixture of perennial grasses, c/ha

The analysis of the fodder value of hay of a mixture of perennial grasses showed, according to the fodder unit: 2 years of life -0.46; 3 years of life – 0.56; 4 years of life - 0.49; and 5 years of life 0.51, which is a good indicator.

Table 2 –Fodder value of hay mixture of perennial grasses by years of development 2022 y.

Indicators, units of change.	perennial herbs 2 years of life	perennial herbs 3 years of life	perennial herbs 4 years of life	perennial herbs 5 years of life
Raw protein, %	16,19	9,81	11,18	11,04
Moisture, %	9,81	9,51	8,98	8,93
Raw fiber, %	31,3	26,7	32,6	28,8
Raw fat, %	2,58	2,10	2,22	2,84
Calcium, %	1,46	0,42	0,93	0,83
Phosphorus, %	0,41	0,36	0,36	0,27
Ash, %	9,08	7,3	5,0	8,18
Carotene, mg/kg	167,23	127,71	167,23	168,48
Feed units	0,46	0,56	0,49	0,51

Barley sown in the second decade of April as a semi-cover crop is used for fodder, which allows you to harvest in the first year and then hay of perennial grasses in the second year of life. The sowing of the Sudanese grass is carried out starting from the second decade of May, which in the second and third decade of July, the crops of the Sudanese grass are mown in the "tubing - earing" phase for hay figure 3, then after regrowth, we carry out bleaching from the third decade of August to the end of September. Good results on the growth of the green mass of the Sudanese grass were obtained in the phase of throwing out the panicle. For this purpose, mowing is recommended to be carried out at a height of 10-12 cm.

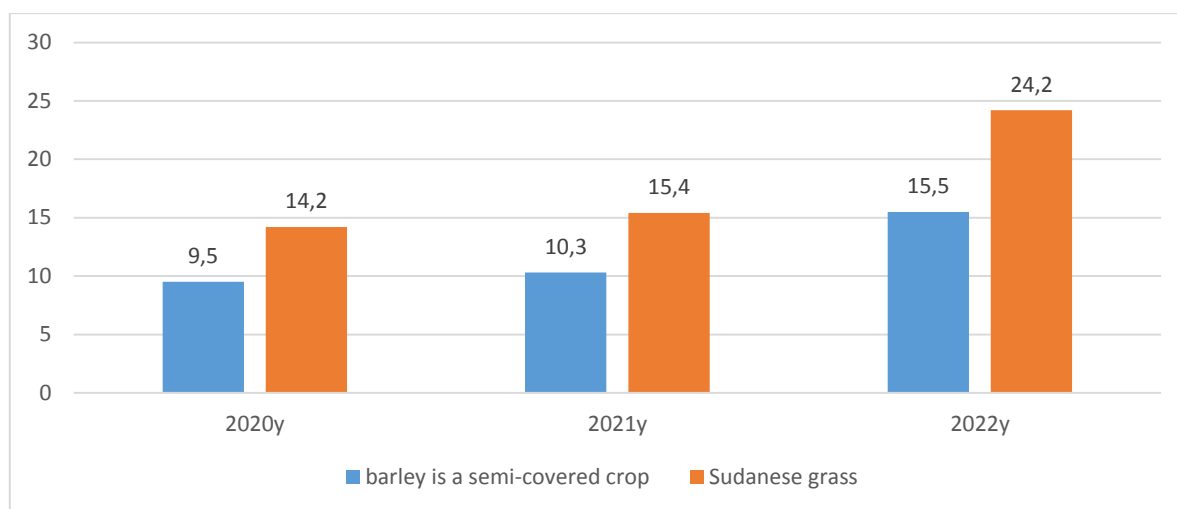


Figure 3 –Yield of annual fodder crops, c/ha

Sowing of fodder sorghum for green fodder is carried out in the second decade of May, which makes good use of the warm period of development and gains vegetative mass, in the panicle phase we recommend to bleed in October- November months, and in the conditions of a warm winter to use as winter pastures.

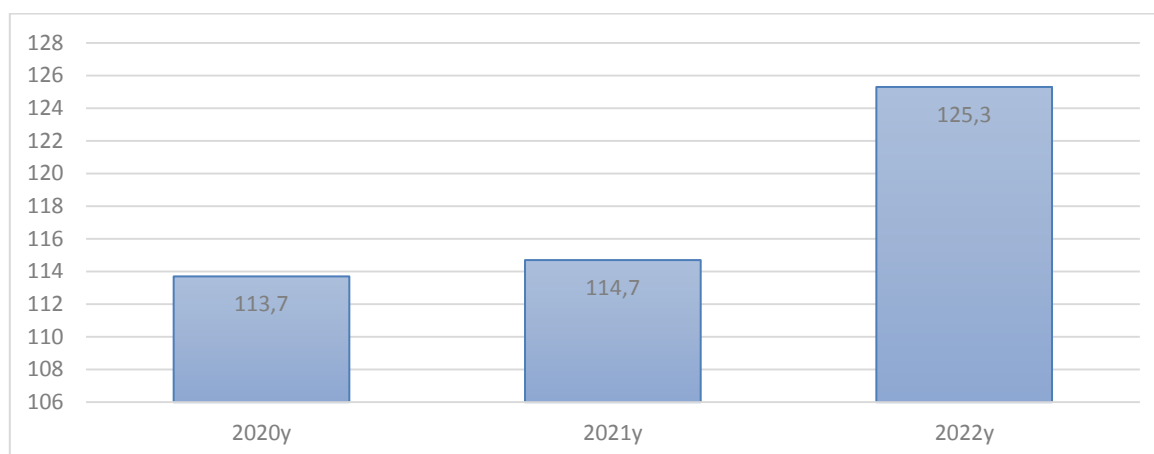


Figure 4 – Productivity of sorghum green mass, c/ha

Figures 2,3,4 show the yield of forage crops, where annual and a mixture of perennial grasses of different years of life give a steady harvest of hay and grain.

One of the biggest advantages of the scheme is that it allows you to provide this region with fodder in any climatic conditions. Due to the saturation of crops with a mixture of perennial grasses up to 70% and grain fodder crops up to 30%, they are the most adapted for cultivation in the region, which suffer from frequent droughts in the summer.

Conclusion To create a fodder base of animal husbandry aimed at solving the problem of using the potential of fodder crops is a real necessity today.

The proposed scheme for the use of forage crops will ensure the supply of pasture feed for 155-160 days and extend the pasture period by 90-95 days, due to the bleaching of annual and perennial grasses, and obtain from a unit area from 113.7 to 125 c / ha of pasture grass green mass and depending on weather and climatic conditions. By the fifth year, the productivity of the mixture of perennial grasses is reduced, it is proposed to use the grasses of the second and third years of use as hay, and the fourth and fifth years for grazing livestock with a feed value from 0.46 to 0.56 feed units.

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ТҮЙІН

Мақалада құрғақ дала аймағындағы жайылымдарда ұсталатын ауыл шаруашылығы жануарларына арналған шабындық-жайылымдық конвейердің әзірленген структурасы қарастырылады. Жемшөп дақылдарын пайдалануға негізделген ұсынылған әдіс көрсетілген, бұл фермерлердің түрлік құрамды, өнімділік деңгейін, экономикалық бағыттылықты ғылыми негізделген таңдау тұрғысынан перспективалы болып табылады. Мақалада житняк, эспарцет, жоңышқадан тұратын көпжылдық шөптер қоспасының дақылдары сипатталған. Судан шөптерінің дақылдары "колошение" кезеңінде кесілгеніне назар аударылады. Судан шөптерінің жасыл массасының ең үлкен өсуі паникуланы лақтыру кезеңінде жүреді, ал жақсы отава алу үшін шабу 10-12 см биіктікте жүргізілуі керек. Жайылым маусымының соңында күзгі суық келеді. Осы кезеңде жануарлар қайтадан жиналған шөппен қоректенетін қораларға оралады. Шабындық-жайылымдық конвейердің ұсынылатын күнтізбелік жұмыс кестесі жайылымдық жемді 155-160 күнге жеткізуді қамтамасыз етеді және біржылдық және көпжылдық шөптердің түссізденуі есебінен жайылымдық кезеңді 90-95 күнге ұзартады. Сондай-ақ, қолайлы ауа-райы мен климаттық жағдайларға байланысты аудан бірлігінен жайылымдық шөптердің жасыл массасының 113,7-ден 125 ц/га дейін алуға болады. Бесінші жылға қарай көпжылдық шөптер қоспасының өнімділігі төмендейді, екінші және үшінші жылдардағы шөптерді шөп ретінде пайдалану ұсынылады, ал төртінші және бесінші жылдары мал жаю үшін жемшөп құндылығы 0,46-дан 0,56-ға дейін.

РЕЗЮМЕ

В статье рассматривается разработанная структура сенокосно-пастбищного конвейера для сельскохозяйственных животных, находящихся на пастбищном содержании в условиях сухостепной зоны. Показан рекомендуемый способ, основанный на использовании посевов кормовых культур, который является перспективным в плане применения фермерами научно-обоснованного подбора видового состава, уровня продуктивности, направлением хозяйственного назначения. В статье дается характеристика посевов смеси многолетних трав состоящих из житняка, эспарцета, люцерны. Главное внимание обращается на то, что посевы ячменя, суданской травы, сорго скашивают в фазу «трубкавание - колошение». Самое большое нарастание зеленой массы суданской травы происходит в фазу выбрасывания метелки, при этом скашивание необходимо проводить на высоте 10-12 см, для того чтобы получить хорошую отаву. Пастьбу на посевах кормового сорго рекомендуется проводить поздней осенью до наступления морозов и выпадения снега. В конце пастбищного сезона наступают осенние холода. В этот период животные снова возвращаются в загоны, где кормление проводится заготовленным сеном. В заключение предлагаем календарный график сенокосно - пастбищного конвейера, который позволит обеспечить поступление пастбищного корма в течении 155-160 дней и продлить пастбищный период на 90-95 дней, за счет скармливания отавы однолетних и многолетних трав. Также, в зависимости от благоприятных погодно-климатических условий, можно получить с единицы площади от 113,7 до 125 ц/га зеленой массы пастбищной травы, от 6,9 до 13,5 ц/га сена многолетних трав с хорошей кормовой ценностью от 0,46 до 0,56 кормовых единиц, что является хорошим показателем.