

**ORGANIZATIONAL AND ECONOMIC MECHANISM FOR THE LAND USE  
IN RURAL AREAS**

**АУЫЛДЫҚ АУМАҚТАРДЫҢ ЖЕРЛЕРІН ПАЙДАЛАНУДЫҢ  
ҰЙЫМДАСТЫРУШЫЛЫҚ-ЭКОНОМИКАЛЫҚ ТЕТІГІ**

**ОРГАНИЗАЦИОННО-ЭКОНОМИЧЕСКИЙ МЕХАНИЗМ ИСПОЛЬЗОВАНИЯ  
ЗЕМЕЛЬ СЕЛЬСКИХ ТЕРРИТОРИЙ**

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**Abstract.** The *goal* is to consider the problems of institutional and organizational-economic mechanisms for the effective use of lands near the village on the basis of assessment of the existing load of livestock in personal subsidiary plots and the system of its maintenance in various natural and agricultural zones. *Objectives* – to analyze pasture use in rural settlements and to present the standards for maximum permissible load of grazing of farm animals on the area of pastures in different climatic zones. *Results* – regions with a shortage of near-aul lands for livestock, high concentration of the rural population, a discrepancy between the livestock number and the level of pasture provision were identified. Areas with a low load of animals on pastures are identified. The ratio of the standards of demand and supply in forage for natural and agricultural zones and animal species is shown. The formula for determining the optimal number of livestock that can be grazed around a settlement, taking into account the feed stock and pasture capacity, is presented. Schemes of pasture rotation are presented and recommendations for their use are developed to preserve the productivity of natural forage areas of zonal types of near-aul pasture lands and to radically improve on the basis of natural economic zoning of the republic. The analysis of the degree of watering of near-village pastures by region is

given. Costs per head unit for transition and long-term periods have been calculated. *Conclusions* – costs for the near future are based on the existing cost structure by item with some amendments. Purchased feed for all types of animals prevails in the cost structure. The degree of maintenance of rangelands in non-State agricultural enterprises within the boundaries of land use, where there is a reserve potential of unused forage lands, has been determined.

Аңдатпа. *Мақсаты* – жеке қосалқы шаруашылықтардағы малдың қазіргі жүктемесін және оны әртүрлі табиғи-ауыл шаруашылығы аймақтарында ұстау жүйесін бағалау негізінде ауыл маңындағы аумақтардың жерлерін тиімді пайдаланудың институционалдық және ұйымдастырушылық-экономикалық тетіктерінің проблемаларын қарастыру. *Міндеттері* – ауылдық елді мекендерде жайылымды пайдалануды талдау және әртүрлі климаттық аймақтардағы жайылымдар алаңына ауыл шаруашылығы малдарын жаюға жол берілетін шекті жүктемесінің нормативтерін ұсыну. *Нәтижелері* – жайылымдық жерлердің жетіспеушілігі, ауыл халқының көп шоғырлануы, қолда бар мал басының жайылымдармен қамтамасыз етілу деңгейіне сәйкес келмеуі анықталған. Жайылымдық жерлерге малдардың жүктемесі төмен аумақтар бөлінген. Табиғи-ауылшаруашылық аймақтары мен мал түрлері бойынша азыққа қажеттілік пен қамтамасыз ету стандарттарының арақатынасы көрсетілген. Жайылымдардың жемшөп қоры мен сыйымдылығын ескере отырып, елді мекеннің айналасында ұстауға болатын мал басының оңтайлы санын анықтау формуласы келтірілген. Жайылым айналымдарының схемалары ұсынылған және республиканың табиғи шаруа-шылықты аймақтандыру негізінде жайылымдық жерлердің аймақтық типтерінің табиғи жем-шөп алқаптарының өнімділігін сақтау және түбегейлі жақсарту үшін оларды пайдалану бойынша ұсынымдар әзірленген. Өңірлер бойынша ауыл жайылымдарының сулану дәрежесіне талдау жасалды. Өтпелі және ұзақ мерзімді кезеңдерге арналған мал басының шығындары есептелген. *Қорытындылар* – жақын арадағы перспективаға арналған шығындар кейбір түзетулері бар баптар бойынша шығыстардың қалыптасқан құрылымына негізделеді. Шығындар құрылымында малдардың барлық түрлері үшін сатып алынатын жем басымырақ болады. Пайдаланылмайтын жем-шөп алқаптарының резервтік әлеуеті бар мемлекеттік емес ауыл шаруашылығы кәсіпорындарында жер пайдалану шекараларында жайылымдық алқаптарды ұстау дәрежесі айқындалған.

Аннотация. *Цель* – рассмотрение проблем институционального и организационно-экономического механизмов эффективного использования земель приаульных территорий на основе оценки существующей нагрузки скота в личных подсобных хозяйствах и системы его содержания в различных природно-сельскохозяйственных зонах. *Задачи* – проанализировать пастбищепользование в сельских населенных пунктах и представить нормативы предельно допустимой нагрузки выпаса сельскохозяйственных животных на площадь пастбищ в различных климатических зонах. *Результаты* – выявлены регионы с недостатком приаульных земель для выгула скота, высокой концентрацией сельского населения, несоответствие содержащегося поголовья уровню обеспеченности пастбищами. Выделены территории с низкой нагрузкой животных на пастбищные угодья. Показано соотношение нормативов потребности и обеспеченности в кормах по природно-сельскохозяйственным зонам и видам животных. Приведена формула определения оптимального количества поголовья скота, которое возможно содержать вокруг населенного пункта, с учетом кормозапаса и емкости пастбищ. Представлены схемы пастбищеоборотов и разработаны рекомендации по их использованию для сохранения продуктивности природных кормовых площадей зональных типов приаульных пастбищных земель и коренному улучшению на основе природнохозяйственного зонирования республики. Дан анализ степени обводненности при-сельских пастбищ по регионам. Рассчитаны затраты на единицу головы на переходный и долгосрочный периоды. *Выводы* – затраты на ближайшую перспективу основываются на сложившейся структуре расходов по статьям с некоторыми поправками. В структуре затрат преобладают покупные корма по всем видам животных. Определена степень содержания пастбищных угодий в негосударственных сельхозпредприятиях в границах землепользований, где имеется резервный потенциал неиспользуемых кормовых угодий.

**Key words:** natural-agricultural zone, near-aul territories, pastures, personal subsidiary plots, land use, livestock, load norms, forage lands.

**Түйінді сөздер:** табиғи-ауыл шаруашылығы аймағы, ауыл маңындағы аумақтар, жайылымдық алқаптар, жеке қосалқы шаруашылықтар, жер пайдалану, мал басы, жүктеме нормалары, жемшөп алқаптары.



organizational and economic, engineering, regulatory and investment.

The organizational and economic methods include a system of measures for using a distant-pasture system for grazing livestock by providing reserve territories at the expense of other categories of land in this region, the development of cooperative processes for organized grazing, collective use of irrigation facilities, marketing of products. Technological methods for the system of pasture use include: carrying out cultural and technical works for qualitative improvement by seeding grasses, carrying out radical improvement of hayfields and pastures, development of pasture turns, corral system of cattle grazing; for the system of animal maintenance – veterinary and zootechnical services, restoration of artificial insemination points, breeding work.

Engineering methods include the creation of irrigated crop hayfields and pastures for the production of coarse and succulent feed, site planning and water delivery mechanisms, construction of infrastructure facilities for water-ring pastures. Investment methods include the volume of attracted investments for the construction of infrastructure facilities and engineering structures, the amount of subsidies, and the cost of cultural and technical work, including the creation of irrigated pastures. Standard method includes compliance with the grazing of livestock in a particular area, the timing of grazing seasons, the optimal animals for 1 household, the marginal returns of households, in line with regional characteristics, production costs per animal of different age groups.

Taking into account the limited area of rural territories and the number of households containing livestock, it is possible to calculate the optimal number of optimal livestock population that should be contained around the village including feed stores according to the following formula:

$$K_{\text{limit}} = \frac{A_{\text{pasture}}}{N_{\text{p.k.}}} = \frac{A_{\text{condit.head}}}{T_{\text{Nhouseh.}}} \times [60 - 80\%], \quad (1)$$

where  $K_{\text{limit}}$  – Maximum rate of keeping livestock in the rural territories;

$A_{\text{pasture}}$  – area of pastures in a particular rural district;

$N_{\text{p.k.}}$  – the standard of the required number of pastures for the maintenance of a conditional head of cattle by the seasons of use (spring-summer-autumn, or only spring-autumn without taking into account summer or winter pastures, which is determined based on the characteristics of natural and agricultural zones and the period of pasture maintenance);

$A_{\text{condit.head}}$  – Conditional number of cattle for the entire area of the rural pastures;

$T_{\text{Nhouseh}}$  – the total number of households in a rural district multiplied by the number of households that contain livestock. It varies by region from 60 to 100% [9,10].

Consistent application of these methods in the development of projects for organizing the territory of the rural pastures will allow us to successfully solve the tasks set in each specific rural (aul) district located in any natural and agricultural zone.

The costs per 1 head of animals for the transition period and long-term period are determined. The cost of the transition period was based on the prevailing cost structure in the articles, with some amendments: include the wages of smallholders by the number of wasted person-hours, determined by the calculation method the demand for electricity, fuel, depreciation of buildings relatively to their actual cost, veterinary and zoo technical services, the cost of rent for cattle grazing in the actually used prices for herdsman services [11].

The cost structure for the transition period is dominated by purchased feed for all types of animals. So, in the desert for cattle, per one structural head they take up 48.5% , for sheep is 38.5%, horses – 51.8%, camels – 26.3 % (per cent); in the mountain foothills-desert – respectively for cattle 53.9 %; sheep -45.4%; horses -50.7%. At the same time, the cost of feed from natural forage lands was not taken into account in the costs. The low share of purchased feed from camels is associated with year-round pasture maintenance. The exception is only a small proportion of roughage during the winter maintenance period.

For the forecast period with increasing animal productivity through improved breeding work, purchase of highly productive cattle, sufficient veterinary and zoo technical services, the establishment of insemination of animals contrary to the free mating, improving the balance of feed, including through the creation of cultural irrigated pastures, all plots in the other categories of land for procurement of fodder and grazing cattle on the distant pastures will increase the yield of farms smallholdings to 30-40% (table1).

Comparative regulatory indicators for the transition and forecast period, using the example of cost standards for 1 head of cattle and sheep in the desert, foothill-desert and mountain zones, will ensure the level of profitability of the private farms on 25-30%.

Table 1 - Recommended indicators of the developed standards for costs per head of livestock in different natural and agricultural zones

Indicator	Transition period			Forward-looking long-term			Cost increase by 1 cattle head, %
	structural head	main herd	young stock	structural head	main herd	young stock	
<b>Desert natural and agricultural zone</b>							
Costs for 1 head of cattle, thousand tenge	68,3	89,6	62,2	87,6	117,0	72,2	116,1
Costs for 1 head of sheep, thousand tenge	14,8	16,5	12,6	16,3	18,1	14,1	110,1
Costs for 1 head of horses, thousand tenge	54,9	73,0	52,1	58,6	77,9	56,4	103,6
Costs for 1 head camels, thousand tenge	33,2	45,2	30,3	35,7	48,7	32,4	107,5
<b>Foothill-desert and mountain zones</b>							
Costs for 1 head of cattle, thousand tenge	73,7	107,5	79,9	87,8	128,0	82,0	111,3
Costs for 1 head of sheep, thousand tenge	17,4	20,1	14,3	19,0	20,9	16,0	109,2
Costs for 1 head of horses, thousand tenge	72,1	96,0	68,4	76,3	101,7	74,6	105,8

The nature of using the pasturelands in rural localities has changed significantly in modern conditions. The process of privatization and denationalization of agricultural enterprises, the reform of the agricultural sector of the economy, led to a reduction in the number of livestock in the public sector and increase it in private farms. Over the past 5 years (2016-2020), there has been a steady growth in the number of livestock in the farms

of the population of the republic: for example, cattle increased from 3 796.2 to 4 094.3 thousand heads, the number of horses increased significantly by 208.2 thousand heads, the number of camels increased by 17.7 thousand heads. The number of sheep and goats remains almost at the same level - 10.7 million heads with small fluctuations over the years, while the area of the rural pastures increases slightly during this period (figure 1).

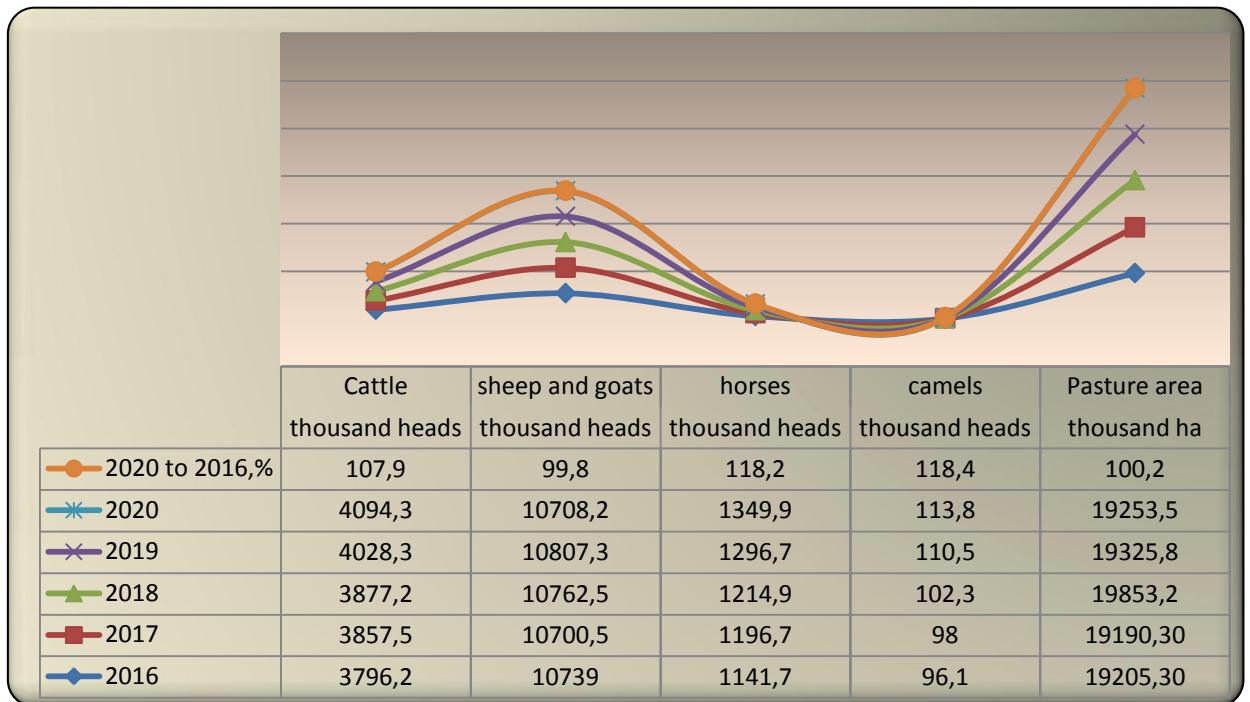


Figure 1 - The number of livestock pasture content in the farms of the population of the republic and the area of the rural pasture lands for the period of 2016-2020

Condition of the pasture use of land settlements that were allocated to the grazing of private farming, were identified based on the following factors: their size, the number of rural settlements, the concentration of rural population, number of households, including cattle, livestock in households. The main criterion for the rational use of pastures near the countryside is the degree of load of livestock corresponding to the standard level of animal maintenance.

The load of livestock acceptable for pastures depends, first of all, on climatic factors, on the size of the maximum capacity (productive capacity) of the grass stand. One of the main conditions for regulating the use of pastures is to establish the optimal timing of grazing from the beginning to the end of grazing in natural and economic zones. So, in relation to Kazakhstan, spring grazing is recommended to start in forest-steppe, steppe and dry-steppe zones with plants growing at least 4-5 cm, in desert and semi-desert zones-2-3 cm. The height of grazing of seeded grasses with radical improvement should not be lower than 4-5 cm, regardless of the natural and economic zone. On natural forage lands, the approximate number of bleedings is: in the steppe and dry-steppe zones-3-4, foothill-steppe-4-5; in semi-desert and desert zones-1-2 times.

The period of grazing on pastures determined by the suitability of pasture feed for grazing and the duration of maintaining its productivity. A particular natural-agricultural zone can provide a certain amount of livestock with feed, commensurate with the feed resources. At the same time, it's recommended to observe the duration of the pasture period in various zones of Kazakhstan: in the steppe and dry – steppe zones - 180-200 days, in the desert and semi – desert - 220-240 days, in the foothill-desert – steppe - 200-220 days.

Determination of the total demand for pasture feed for the grazed livestock of the population's farms in the rural territories should be guided by the consumption rates of green feed (on average per animal, kg). For instance: for cows - 40-75 kg; young cattle of junior yearling - 30-40 kg; cattle younger than one year-15-25 kg; for sheep - 6-8 kg (in steppe areas and deserts due to dryness of the feed - 3-6 kg); lambs – 2-3 kg; horses and camels – 30-40 kg. Based on the need, in the structure of sheep feed, pasture (green) feed should occupy at least 65%.

The assessment of pasture use based on the load of livestock in rural areas in different natural and economic zones showed significant fluctuations. In the forest-steppe and steppe zones, there is a lack of pastures, the

level of provision of pasture feed for livestock farms of the population on average reaches 50%. In semi-desert and desert zones, the volume of green (pasture) feed is quite high and provides feed to the existing livestock of the individual sector. In the desert zone, the lowest load on pastures is 27.3 ha per 1 conditional head of cattle, with a norm of 9.52 ha.

Large areas of the near-rural territories contain insufficient livestock for their full use, which leads to overgrowth of uneaten and harmful vegetation, which negatively affects the productivity of pastures. Significant areas of land in rural localities allocated for use by private farms in desert and semi-desert zones are primarily associated with unfavorable natural and climatic conditions: high temperature conditions in the summer, low precipitation. The yield of natural grass stands in these zones is low, with an average of 2-3.5 C / ha of dry mass. At the same time, despite the low productivity of these pastures, the owners of private farms have the opportunity to keep animals on pastures all year round, with driving to winter pastures mainly young cattle, sheep, horses and camels.

A big problem in the desert and semi-desert zones is the presence of non-watered areas, which reduces the rate of feed consumption per 1 head of livestock. Especially there is a shortage of watered pastures in the central and western regions. In the central region, out of 2 599.3 thousand hectares of rural pastures, 1 199.7 thousand hectares are watered, which content 46.1%. In the western region, the level of waterlogged pastures is 64.5%, the rural pastures of the northern region are watered by 69.6%. More fully watered pastures in the eastern and southern regions, so here the percentage of waterlogged pasture is 89.2% and 86.9%, respectively. Farms located in the foothill-desert-steppe, foothill-desert and mountain zones experience a significant shortage of rural pastures. These areas have a dense rural population density, a high concentration of livestock in the individual sector, and as a result, an excessive load on pastures.

In the mountain, mountain - steppe, and foothill-desert-steppe zones, there is some contradiction in the use of pastures compared to the standard level. The agricultural development of the foothill plains is extremely high, they are almost completely plowed, the remaining part is experiencing a large pasture load, and the shortage of forage land is especially evident in the summer. The level of provision of green fodder for livestock farms of the population here remains low and does not correspond to the acceptable norm.

The assessment of the pasture using by livestock of small farms per household showed that in semi-desert and desert natural-agricultural zones, the level of security significantly exceeds the standard requirement

for one conditional head of cattle. At the same time, there is an acute shortage of pastures in the mountainous, mountain-steppe and foothill-desert zones (figure 2) [12].

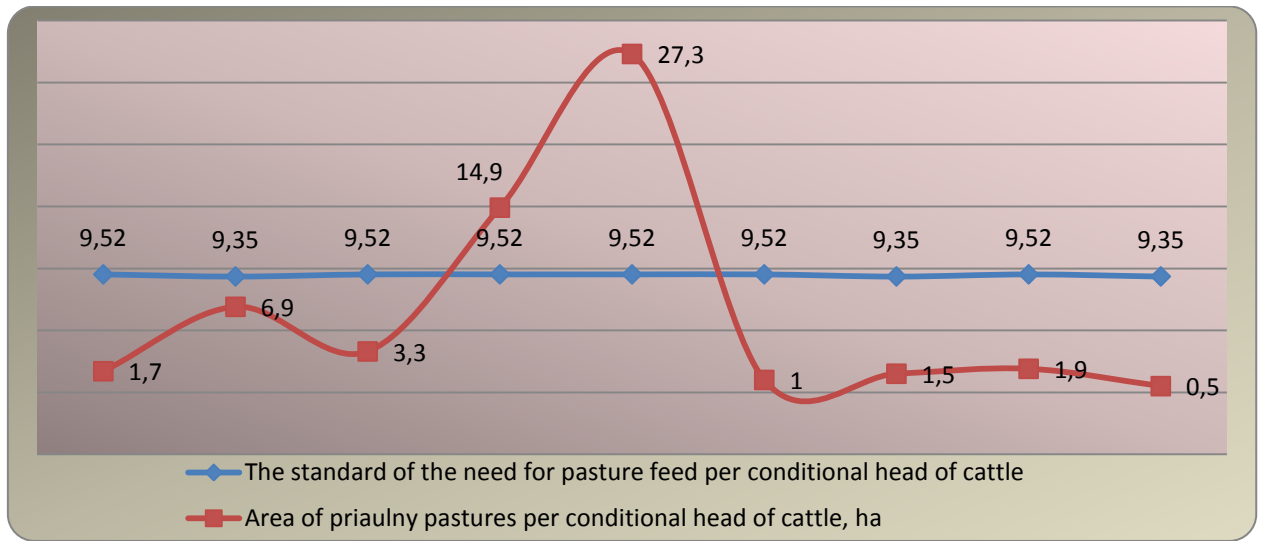


Figure 2 - Ratio of standards of demand and availability of pasture feed in typical areas of different natural and agricultural zones

Excess animal husbandry in private farms forces households of the mountain, mountain - steppe and foothill-desert-steppe zones forces the owners of livestock farms of the population to use reserve land of other categories, other forms of management-agricultural enterprises.

Reserve territories here are reserve lands, as well as the lands of non-state agricultural enterprises, which, due to the small number of animals, underutilize more than 60% of pastures in Kazakhstan as a whole.

Pastures assigned to farms are used at full capacity. In non-state agricultural enterprises, with 21.8 million hectare

The analysis of pasture using within the boundaries of land use of non-state agricultural enterprises in the central region showed that the degree of their use is 22%, in the west-30%, in the east-38%. In the northern region (Akmola, Kostanay, and North Kazakhstan regions) underutilization of pastures in the range of 30-40 %. The indicators of agricultural enterprises from the western region also reflect the presence of unused pastures and in the farms of the southern region pastures usage content 53%. The reserve of unused pastures in agricultural enterprises of the republic is 14.8 million hectares. In non-state agricultural enterprises for one conditional sheep head there are 5 hectares of pasture, which exceeds the norm by 2.5 times. At the same time, the congestion of pasture lands allocated for grazing

livestock of personal subsidiary farms exceeds the norm by 4.2 times.

Thus, there are potential opportunities for joint use of pasturelands for grazing livestock of the rural population on the lands of agricultural enterprises adjacent to localities and having free hay and pasturelands. This is also due to the fact that the owners of private farms are also members of non-state agricultural enterprises and have land shares in the main land use of agricultural enterprises.

Proper organization of grazing provides for determining the capacity of pastures, which is set taking into account the yield and area of pasture territories. Based on the daily need for green feed for various animal species, the General need for green mass for the entire grazed livestock is determined according to zootechnical standards, taking into account the standards adopted for certain natural and agricultural zones (table 2) [13].

Organizational and economic directions for effective use of pastures are closely related to technological methods, such as maintaining natural grass during the grazing period, maintaining high productivity of pastures, the length of stay of animals on a specific territory, carrying out cultural and technical works, and observing pasture turnover. It is necessary to take into account the seasonality of grazing and the timing of their usage, the capacity of the pastures, feeding grazing animals, the allowable utilization of forage mass, pasture insurance fund.

Table 2 - Approved standards of demand for cattle feed and their structure by regions and natural and agricultural zones of Kazakhstan

Types of feed	Region, natural and agricultural zone					
	Northern, central, eastern and southern (areas located in the steppe, mountain and foothill - desert zones)			Northern, western, central, eastern and southern (areas located in the dry-steppe, semi-desert, desert and foothill - desert-steppe zones)		
	dairy			beef		
	start of the year, in total	including		start of the year, in total	including	
main herd		young animals of all ages	main herd		young animals of all ages	
Annual feed requirement per 1 head, center of feed units	26,7	38	21	23,8	30	20
Including: roughage	5,34	7,6	4,2	5,95	7,5	5,0
Concentrated	6,7	9,5	5,25	4,76	6,0	4,0
Juicy	5,3	7,6	4,2	3,57	4,5	3,0
Green (pasture)	9,35	13,3	7,4	9,52	12	4

For forest–steppe, steppe and dry-steppe zones, spring-summer-autumn pastures can be used in the system of four-field four-year pasture rotation. In the conditions of a semi-desert zone with sparse vegetation, it is recommended to use a five-year pasture rotation. With such an alternation of grazing periods for the second and fourth year, most of the plants will be grazed after seeding, which will allow the grass stand to resume normally. In the mountain-steppe and foothill - desert-steppe zones, it is possible to use pastures in a five-year five-field pasture rotation. It is recommended a three-season, three-year pasture rotation scheme on modified desert pasture massifs. Pastures with knocked-out, depleted grass stand are recommended for use in a five-year pasture rotation [14].

In order to ensure uninterrupted supply of green fodder for farm animals during the pasture period, we offer to carry out radical improvement on over-grazed, downed and unproductive pastures by seeding grasses. Radical improvement of pastures is most effective, the resulting feed has a lower cost, despite significantly higher primary costs compared to surface improvement, and is practiced in all natural and climatic zones where rain fed farming is possible. These measures will reduce the load of livestock on pastures and ensure more sustainable productivity.

For regulation of pasture using by livestock farms, it is possible to organize cooperatives or simple partnerships for cattle grazing, veterinary and zoo technical services, product sales, organization of watering and other services. An accelerated solution to the problem of reducing the load of livestock on rural pastures and limiting the grazing population within the

boundaries of localities, setting standards for keeping livestock per household, restoring the cattle grazing system by attracting additional reserve land, reconstruction and construction of irrigation facilities in the desert zone will create favorable economic and social conditions for rural residents, increase the productivity of pasture use by 2.5 times, and increase the profitability of farms by 20-30%.

**Conclusion**

For effective use of the rural territories, it is recommended to optimize the number of livestock on farms in accordance with the available feed stock on the allocated territory in order to prevent degradation of pasture lands.

Use the potential of pasture lands in the mountain, mountain-steppe and foothill-steppe zones at the expense of reserve lands and unclaimed lands of existing agricultural formations for grazing rural population adjacent to localities.

In the regions, there are potential opportunities to increase pastureland for grazing livestock of the rural population at the expense of reserve land and non-state agricultural enterprises adjacent to localities that have free hay and pasture land. As well as the restoration of the system of distance animal husbandry, the development of cooperation on maintenance of water intake structures in desert and semi-desert zones.

Introduce pasture rotations and a corral system for grazing livestock of households on pastures by co-operating in herds of dairy cows and horses.

For private farms located in desert and semi-desert natural and agricultural zones for effective use of pastures is necessary their complete watering.





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