DAIRY AGRICULTURAL COOPERATIVES IN THE TURKESTAN REGION OF KAZAKHSTAN: QUALITATIVE INDICATORS AND GROWTH PATTERNS

ҚАЗАҚСТАННЫҢ ТҮРКІСТАН ОБЛЫСЫНДАҒЫ СҮТ АУЫЛ ШАРУАШЫЛЫҒЫ КООПЕРАТИВТЕРІ: САПАЛЫҚ КӨРСЕТКІШТЕР ЖӘНЕ ӨСУ ЗАҢДЫЛЫҚТАРЫ

МОЛОЧНЫЕ СЕЛЬСКОХОЗЯЙСТВЕННЫЕ КООПЕРАТИВЫ В ТУРКЕСТАНСКОЙ ОБЛАСТИ КАЗАХСТАНА: КАЧЕСТВЕННЫЕ ПОКАЗАТЕЛИ И ЗАКОНОМЕРНОСТИ РОСТА

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Abstract. The relevance of the study is due to the need for a comprehensive and integrated approach to considering the dynamics, trends and prospects of the development of dairy agricultural cooperatives in the Turkestan region, taking into account the totality of economic, social, institutional and organizational and managerial factors. The *goal* is to analyze the current state of collective forms of dairy farming and identify the reasons that inhibit their spread, as well as develop recommendations aimed at strengthening the positions of cooperatives in the regional economy. *Methods* - economic analysis in identifying patterns in the activities of economic entities, statistical data processing – to ensure quantitative interpretation of Primary Information, expert assessment-when accounting for qualitative criteria. *Results* - a systematic thematic literature review on cooperation in agriculture was prepared using the international scientific databases Scopus, Web of Science, Google Scholar, the main indicators characterizing the current state and improvement process of Cooperative Associations of dairy farms in the region were presented, SWOT analysis was carried out to justify the weaknesses and strengths of cooperating small farm facilities. Using the method of expert assessment, the authors formulated measures to stimulate, support, strengthen and expand the dairy cooperative sector. The results of this scientific work can be used

Development of cooperation, production means market

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by government agencies responsible for implementing strategies to support the cooperative movement in the agricultural sector, as well as farmers seeking to improve the effectiveness of their activities on the basis of the cooperative model of entrepreneurship. The conducted research will form a methodological and applied basis for further increasing the potential of dairy agricultural cooperatives in the Turkestan region.

Аңдатпа. Зерттеудің өзектілігі экономикалық, әлеуметтік, институционалдық және ұйымдастырушылық-басқарушылық факторлардың жиынтығын ескере отырып, Түркістан облысындағы сүт ауыл шаруашылығы кооперативтерінің даму динамикасын, үрдістері мен келешегін қарастыруға жан-жақты және кешенді көзқарастың қажеттілігіне байланысты. *Мақсаты* - сүт шаруашылықтарын ұжымдық жүргізу нысандарының қазіргі жай-күйін талдау және олардың таралуын тежейтін себептерді анықтау, сондай-ақ кооперативтердің өңірлік экономикадағы ұстанымдарын нығайтуға бағытталған ұсынымдар әзірлеу. *Әдістер* - шаруашылық жүргізуші субъектілердің қызметіндегі заңдылықтарды анықтаудағы экономикалық талдау, деректерді статистикалық өңдеу – бастапқы ақпараттың сандық түсіндірілуін қамтамасыз ету үшін, сараптамалық бағалау – сапалық критерийлерді есепке алу кезінде. *Нәтижелер* - Scopus, Web of Science, Google Scholar халықаралық ғылыми дереккорларын пайдалана отырып, ауыл шаруашылығындағы кооперация мәселелері бойынша жүйелі тақырыптық әдеби шолу дайындалды, өңірдің сүт шаруашылықтарының кооперативтік бірлестіктерінің ағымдағы жай-күйі мен жетілдіру үдерісін сипаттайтын негізгі индикаторлар ұсынылды, кооперацияланатын шағын шаруашылық нысандарының әлсіз және күшті жақтарын негіздеу үшін SWOT-талдау орындалды. Авторлар сараптамалық бағалау әдісін пайдалана отырып, сүт кооперативі секторын ынталандыру, қолдау, нығайту және кеңейту жөніндегі шараларды тұжырымдады. Осы ғылыми жұмыстың *қорытындылары* – қорытындыларын аграрлық саладағы кооперативтік қозғалысты қолдау стратегияларын іске асыруға жауапты мемлекеттік органдар, сондай-ақ кәсіпкерліктің кооперативтік үлгісі негізінде өз қызметінің нәтижелілігін арттыруға ұмтылатын фермерлер пайдалана алады. Орындалған зерттеу Түркістан облысында сүт ауыл шаруашылығы кооперативтерінің әлеуетін одан әрі арттыру үшін әдіснамалық және қолданбалы негіз қалыптастырады.

Аннотация. Актуальность исследования обусловлена необходимостью всестороннего и комплексного подхода к рассмотрению динамики, тенденций и перспектив развития молочных сельскохозяйственных кооперативов в Туркестанской области с учетом совокупности экономических, социальных, институциональных и организационно-управленческих факторов. *Цель* - проанализировать современное состояние форм коллективного ведения молочных хозяйств и идентифицировать причины, сдерживающие их распространение, а также разработка рекомендации, направленных на усиление позиций кооперативов в региональной экономике. *Методы* - экономический анализ при выявлении закономерностей в деятельности хозяйствующих субъектов, статистической обработки данных - для обеспечения количественной интерпретации исходной информации, экспертных оценок – при учете качественных критериев. *Результаты* - подготовлен системный тематический литературный обзор по вопросам кооперации в сельском хозяйстве с применением международных научных баз данных Scopus, Web of Science, Google Scholar, представлены ключевые индикаторы, характеризующие текущее состояние и процесс совершенствования кооперативных объединений молочных хозяйств региона, выполнен SWOT-анализ для обоснования слабых и сильных сторон кооперирующихся малых форм хозяйствования. Авторами сформулированы меры по стимулированию, поддержке, укреплению и расширению молочного кооперативного сектора с использованием метода экспертных оценок. *Выводы* – итоги данной научной работы могут быть использованы государственными органами, ответственными за реализацию стратегий поддержки кооперативного движения в аграрной сфере, а также фермерами, стремящимися повысить результативность своей деятельности на основе кооперативной модели предпринимательства. Выполненное исследование формирует методологическую и прикладную основу для дальнейшего наращивания потенциала молочных сельскохозяйственных кооперативов в Туркестанской области.

Key words: agricultural sector, farms, national economies, cattle, dairy cooperatives, production, processing, milk, dairy products.

Түйінді сөздер: аграрлық сектор, фермерлік қожалықтары, халық шаруашылықтары, ірі қара мал, сүт кооперативтері, өндіріс, өңдеу, сүт, сүт өнімдері.

Introduction: The development of dairy livestock farming plays a pivotal role in ensuring food security and enhancing the resilience of Kazakhstan's agro-industrial sector. Within this framework, dairy agricultural cooperatives serve as a vital mechanism for increasing the competitiveness of farming enterprises, consolidating resources, and improving market access for dairy products. In the Turkestan region, which possesses substantial agricultural potential, dairy cooperatives can facilitate the efficient utilization of natural and economic resources, thereby contributing to the sustainable growth of the sector (Kydyrbaeva E.O., Baidybekova S.K., Tolamisova A.G.) [1].

In recent years, Kazakhstan has witnessed significant transformations in the structure of its agricultural production. These changes have been driven both by government-led initiatives aimed at supporting the cooperative movement and by broader market forces. Nevertheless, despite the growing significance of cooperatives in rural development, their expansion continues to face several challenges. These include insufficient financial and technical resources, limited access to modern milk processing technologies, and a pressing need for capacity building among farmers.

The relevance of this study is underscored by the need for a comprehensive analysis of the dynamics and future prospects of dairy agricultural cooperatives in the Turkestan region, taking into account economic, social, and organizational factors. This article explores key trends in the development of the cooperative sector, identifies current barriers, and outlines policy recommendations aimed at enhancing its overall effectiveness. The purpose of this study is to analyze the current state of dairy agricultural cooperatives in the Turkestan region, identify the key factors hindering their development, and formulate recommendations aimed at strengthening their position within the regional economy.

To achieve it, the following tasks were undertaken: conduct a literature review on the development of agricultural cooperation using international academic databases such as Scopus, Web of Science, and Google Scholar; analyze the indicators of dairy agricultural cooperatives development in the Turkestan region; perform a SWOT-analysis to identify the strengths and weaknesses of dairy cooperatives based on the collaboration of small-scale farming enterprises in the region; develop practical recommendations for advancing dairy cooperatives using the expert assessment method.

The research methodology involves the application of economic analysis, statistical data processing, and expert evaluation techniques relevant to the topic. The findings of the study may be of practical interest to government bodies engaged in formulating strategies for supporting the cooperative movement, as well as to farmers seeking to improve the efficiency of their operations through cooperative models. In conclusion, this research contributes to the development of both scientific and practical foundations for the further advancement of dairy agricultural cooperatives in the Turkestan region.

Literature Review

The review of international scholarly literature on agricultural cooperation reveals a substantial body of knowledge and a wide array of methodological approaches to studying this subject. For instance, Qorri D., Felfoldi J. [2] emphasizes the critical role of cooperative organizations within the agricultural sector. His work explores the motivations driving farmers to establish cooperatives and examines the contribution of such entities to the improvement of the economic well-being of agricultural producers. Wossen T., Abdoulaye T., Alene A. et al. [3] presents a systematic review of studies on innovation within agricultural cooperatives.

This research positions cooperatives as essential instruments for advancing various branches of the agricultural industry. Fulton M., Giannakas K. [4] provide a meta-analysis of the impact of social capital on cooperative performance outcomes. Iliopoulos C., Cook M. [5] investigate the global influence of cooperative membership on agricultural market outcomes. Their analysis focuses on how participation in cooperatives affects farmers' access to markets and price formation.

Furthermore, Bijman J., Hohler J. [6] has conducted a systematic review of studies related to the governance and operational efficiency of agricultural cooperatives. Collectively, these works underscore the multifaceted nature of agricultural cooperation and highlight its significance as a strategic tool for enhancing productivity, market integration, and economic sustainability in rural areas.

The study highlights key aspects of corporate governance that significantly influence the performance of cooperatives. Liu Y., Ma W., Renwick A. et al. [7] explore the role of cooperatives in promoting sustainable agriculture. Their research assesses the contributions of cooperatives to mitigating environmental impacts and enhancing ecological sustainability. The present study also draws on the work of domestic scholars, notably Smagulova Sh., Abdrakhmanov R., Imashev A. et al. [8], whose research examines various cooperative models within Kazakhstan's agricultural sector. This work identifies both successful practices and the challenges faced by cooperatives in the region. Zhumabekov R. [9], in his study evaluated the performance of agricultural cooperatives amid evolving market conditions and analyzed how market fluctuations impact cooperative operations.

Existing research highlights the vital role of cooperation in agriculture and identifies various areas that require deeper analysis. These studies contribute both theoretical foundations and practical recommendations for improving cooperative models in the sector. In Kazakhstan, cooperative development is seen as a strategic priority, with pilot initiatives demonstrating strong results - such as increased crop yields and livestock growth - indicating the potential for broader implementation supported by modern technologies and tailored to regional needs (President Kassym-Jomart Tokayev's …) [10]. In this context, the author deems it necessary to conduct a comprehensive analysis of cooperatives based on the performance of the dairy cattle sector and to develop evidence-based recommendations for advancing dairy-oriented cooperatives in Turkestan region.

Materials and Methods

The research employed a combination of methodological approaches. A comprehensive literature review was conducted on the topic of agricultural cooperation, utilizing academic databases such as Scopus, Web of Science, and Google Scholar. Additionally, journals recommended by the Science and Higher Education Quality Assurance Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan. For example, journal «Problems of AgriMarket», Bulletin of the National Academy of Sciences of the Republic of Kazakhstan were consulted to examine relevant studies by both Kazakhstan and international scholars. Statistical analysis was also a core component of the study.

The primary data sources included publications from the Bureau of National Statistics of the Agency for Strategic Planning and Re-

forms of the Republic of Kazakhstan, specifically: the statistical yearbook Regions of Kazakhstan, Agriculture, forestry, and fisheries in the Republic of Kazakhstan (2020-2024). On the Activities of agricultural and the Turkestan Region, and Index and average prices of socially significant food products, among others. Following the completion of the literature review and statistical analysis, the authors employed the SWOT-analysis method to identify the strengths and weaknesses associated with the development of dairy cooperatives based on the cooperation of small-scale farming units in Turkestan region. The study identified major barriers to the development of dairy cooperatives and proposed targeted recommendations based on expert assessments, in line with the research goals and objectives.

Results

At present, household subsidiary farms remain the primary producers of milk in the Republic of Kazakhstan, accounting for 61.1% of total milk output. According to the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, the cattle population in 2024 amounted to 6 616.8 thousand head, reflecting a 31% decline compared to 1991, when the figure was 9 592. 4 thousand head. However, a positive trend is observed in the number of dairy cows, which reached 3 658.7 thousand head in 2024 - an increase of 4.8% relative to the 1991 level. Milk production has also demonstrated a favorable trajectory over the period from 1991 to 2024, with total output increasing by 31.4%. In addition, average milk yield per cow rose from 1 934 kilograms to 2 524 kilograms during the same timeframe (Bulletin "Main indicators of the development…) [11].

An analysis of dairy farming by farm categories in the Turkestan region reveals that in 2024, private household farms accounted for 72.7% of the total milk produced in the region. At the same time, the share of land allocated to these households for grazing purposes represented only 1.8% of the total area under forage crops in the region. Notably, this land allocation is not supported by any state or local government programs (Regions of Kazakhstan in 2024…) [12]. These circumstances underscore the pressing need for state support measures to promote agricultural cooperation (Zanten H., van Ittersum Martin K., De Boer Imke J.M.) [13]. Moreover, as of today, Kazakhstan lacks a legislative framework that enables the provision of direct government support to cooperatives, despite the fact that cooperatives around the world benefit from a wide range of incen-

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tives and state assistance (Akimbekova G., Moldashev A., Dzhambaeva G.A.) [14].

In light of international best practices and successful domestic examples, it is imperative to fully explore and unlock the potential of private household farms in order to enhance national food security. To provide a more detailed analysis, we turn to the key performance indicators of agricultural cooperatives in the Turkestan region. Table 1 presents the total number of cattle owned by agricultural cooperatives across various districts of the region.

Table 1 – Total number of cattle in agricultural cooperatives of the Turkestan region (head)

Districts of the region	2022		2023		2024		2024/2022, +, -	
	cattle	including cows	cattle	including cows	cattle	including cows	cattle	including cows
Turkestan region	12 678	5 046	23 104	15 685	29 065	21 984	16 387	16 938
Arys city of regional significance	-	-	-	-	230	8	-	-
Kentau city of regional significance	856	65	660	660	966	856	110	791
Baydibek	-	-	1 170	206	885	176	-	-
Keles	30	6	3	-	60	-	30	
Kazygurt	303	84	1 239	84	957	214	654	130
Ordabasy	966	-	198	-	144	-	-822	-
Otrar	602	-	599	-	548	-	-54	-
Sayram	7 834	3 972	15 493	12 500	20 675	17 350	12 841	13 378
Saryagash	121	82	172	82	76	15	-45	-67
Sauran	-	-	473	50	457	90	-	-
Suzak	217	-	282	-	368	-	151	-
Toleby	991	730	2 312	1 856	2 943	2 888	1 952	2 158
Tulkibas	308	107	503	247	706	387	398	280
Shardara	450	-	-	-	50	-	-400	-
Note: based on data from "On the activities of agricultural cooperatives in the Turkestan region in 2024" (On the activities of agricultural…) [15].								

The analysis of table 1 data reveals a generally positive trend in the development of agricultural cooperatives in the Turkestan region, particularly in the context of increasing dairy livestock numbers. The Sayram and Tolebi districts have played a leading role in this process. The primary drivers of growth include access to government support measures, enhanced economic efficiency of the cooperative model, and rising demand for dairy products. At the same time, the decline observed in several districts underscores the need for a differentiated regional policy that accounts for local resources, infrastructure availability, and the management capacity of cooperatives (On the activities of agricultural…) [15]. To gain a more comprehensive understanding, the next section will examine the number of agricultural cooperatives currently operating in the Turkestan region (table 2).

According to the data presented in table 2, the period from 2020 to 2024 has shown a steady positive trend in the development of the cooperative sector in Turkestan region. The total number of agricultural cooperatives increased from 682 units in 2020 to 981 units in 2024, representing an absolute growth of 299 units or 143,8%. This upward trajectory indicates a growing interest among agricultural producers in the cooperative model of farming, the expansion of government support mechanisms such as subsidies and tax incentives, and the strengthening institutional role of cooperatives in ensuring regional food security.

Table 2 - Number of agricultural cooperatives in the Turkestan region for the period 2020-2024, units

Districs of the region	2020	2021	2022	2023	2024	Growth rate 2024 by 2020, %
Turkestan region	682	724	794	941	981	143.8
Turkestan city	8	8	10	8	12	150.0
Arys city of regional significance	20	22	25	36	37	185.0
Kentau city of regional significance	14	14	16	18	18	128.6

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Baydibek	76	80	89	119	125	164.5
Zhetysay	60	64	66	72	65	108.3
Keles	33	35	37	51	51	154.5
Kazygurt	42	46	59	64	72	171.4
Maktaaral	38	41	46	49	50	131.6
Ordabasy	59	65	70	76	82	139.0
Otrar	40	41	45	49	48	120.0
Sayram	75	79	83	92	104	138.7
Saryagash	23	25	28	53	57	247.8
Sauran	59	63	68	78	76	128.8
Suzak	21	22	26	30	30	142.9
Toleby	42	44	43	48	50	119.0
Tulkibas	33	35	38	46	51	154.5
Shardara	39	40	45	52	53	135.9
Note: based on data from Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan						

The highest cooperative growth was observed in Saryagash district (+247%), indicating increased participation of small farms in joint agricultural projects, while Baydibek (+164%) and Kazygurt (+171%) districts also showed strong dynamics, likely due to resource consolidation and diversification efforts; moderate increases were recorded in Maktaaral (+132%) and Shardara (+136%) districts, reflecting gradual development amid resource constraints. The growth of the cooperative sector can be attributed to several key factors: subsidization of machinery acquisition, access to preferential credit, training programs for cooperative members, and the provision of necessary infrastructure. Additionally, the simplification of registration procedures, the implementation of digital platforms for cooperative management, collective efforts by farmers to improve the efficiency of product marketing, resource procurement, and market access, as well as the development of logistics, processing facilities, and retail networks in rural areas, have all contributed to this expansion.

Thus, the increase in the number of agricultural cooperatives in the Turkestan region reflects the emergence of a stable and sustainable cooperative model within the agricultural sector. At the same time, regional disparities in growth rates highlight the influence of localized factors - ranging from resource availability to the effectiveness of local administrative initiatives. Overall, the observed positive dynamics point to a growing level of organization among agricultural producers and their commitment to achieving long-term sustainability through cooperative structures. To deepen the analysis of dairy farming in the region, it is essential to examine milk production indicators across all categories of agricultural holdings (table 3).

Table 3 – Milk production across all categories of agricultural holdings in the Turkestan region for the period 2020–2024 (thousand tons)

Title	2020	2021	2022	2023	2024	Growth rate 2024 by 2020, %
In all categories of farms						
Milk	756.5	772.9	386.1	409.2	460.5	60.9
Cow's milk	748.3	764.8	378.1	396.2	447.1	59.7
Agricultural enterprises						
Milk	30.3	34.1	34.0	57.3	112.2	370.3
Cow's milk	30.0	33.8	33.6	56.9	111.8	372.7
Individual entrepreneurs and peasant or farm households						
Milk	18.5	18.6	11.3	12.4	13.3	71.9
Cow's milk	17.9	18.0	10.7	11.4	12.2	68.2
Households						
Milk	707.6	720.2	340.8	339.5	335.1	47.4
Cow's milk	700.4	713.0	339.9	327.9	323.1	46.1
Note: compiled by the author by source (Regions of Kazakhstan in 2024…) [12]						

Between 2020 and 2024, total milk output in the Turkestan region declined by 39%, primarily due to reduced cow numbers and lower productivity, while agricultural enterprises showed growth, with milk production increasing by over 270%, indicating sectoral shifts in efficiency and resource concentration. This upward trend can be explained by the consolidation and modernization of large-scale dairy complexes, along with the adoption of innovative feeding and animal husbandry technologies. Furthermore, state support through subsidies and preferential credit mechanisms has played a critical role in enhancing the production capacities of agricultural enterprises.

For the same period, milk production by peasant farms and individual entrepreneurs declined by over 28-32%, while private households experienced a 52-54% drop, largely due to financial constraints, poor infrastructure, market inaccessibility, and structural challenges such as rural depopulation and low mechanization. The dairy sector in Turkestan region is undergoing structural changes, with production gradually shifting from household farms to larger enterprises; however, declining output and growing import dependence highlight the need for state support to promote cooperatives, modernize infrastructure, and improve sector sustainability.

In the authors' view, the successful development of dairy cattle farming within the framework of small-scale agricultural units can be effectively supported through agricultural cooperation. Under cooperative arrangements, private household farms and smallholder enterprises can establish stable milk marketing channels, engage in milk processing, and perform functions related to the promotion and distribution of final dairy products. This integrated approach can enhance the overall efficiency of the dairy sector by reducing the full cost per centner of milk and increasing the profitability of its production. The milk and dairy market serve as an economic mechanism that links raw milk producers, processing enterprises, retail distributors, and end consumers of finished dairy products. To assess the performance of cooperative-based dairy marketing, table 4 presents data on the volume of milk sold by agricultural cooperatives in the Turkestan region.

Table 4 – Volume of milk sales by agricultural cooperatives in the Turkestan region

Districts of the region	2022		2023		2024	
	Raw milk from cattle dairy herds					
	in physical terms, tons	in value terms, thousand tenge	in physical terms, tons	in value terms, thousand tenge	in physical terms, tons	in value terms, thousand tenge
Turkestan region	25 406.4	3 765 113.8	50 535.8	7 378 944.1	101 710.9	15 324 199
Kentau city of regional significance	-	-	978.0	206 385.0	3 706.0	793 084.0
Baydibek	-	-	36.5	6 522.0	9.1	2 030.0
Keles	-	-	-	-	-	-
Kazygurt	-	-	41.0	6 150.0	21.5	3 450.0
Ordabady	-	-	-	-	-	-
Arys city of regional significance	-	-	-	-	-	-
Sayram	19 337.2	2 981 428.4	41 030.1	5 822 242.0	82 483.5	12 187 479.0
Saryagash	26.7	3 537.0	16.8	2 514.0	2.0	483.0
Sauran	-	-	361.9	49 508.0	576.9	95 180.0
Suzak	-	-	-	-	-	-
Toleby	26.7	3 537.0	7 147.7	1 135 087.1	13 816.0	2 077 823.0
Tulkibas	26.7	3 537.0	923.8	150 536.0	1 095.9	164 670.0
Note: compiled by the author according to the source (On the activities of agricultural…) [15]						

According to the data presented in table 4, from 2022 to 2024, milk sales by agricultural cooperatives in Turkestan region grew more than fourfold in volume and over threefold in value, driven by infrastructure improvements, state support, and the consolidation of dairy production in districts like Sairam and Tolebi.

Also, several districts have demonstrated either zero or extremely low performance indicators throughout the entire period under review. These include the Keles, Ordabasy, Arys city of regional significance and Suzak districts. The underlying reasons may include the absence of registered and operational coopera-

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tives, limited support from local executive authorities, underdeveloped infrastructure and logistics, and barriers to market access. This situation warrants the attention of agricultural policy institutions, as these districts are failing to realize their potential in dairy production and cooperative development (On the activities of agricultural…) [15].

The analysis of milk sales volumes by agricultural cooperatives in the Turkestan region for the period 2022-2024 reflects a significant strengthening of the cooperative sector's role in the regional agricultural economy. The growth in both sales volume and revenue indicates the effectiveness of the cooperative model under conditions of government support, modernization, and market orientation. However, regional disparities remain pronounced. While districts such as Sayram and Tolebi have shown dynamic growth, other areas exhibit complete or partial inactivity of cooperatives. This highlights the need for targeted policy instruments aimed at stimulating cooperative development in lagging districts. Such measures should include investment in infrastructure, capacity-building initiatives, and the establishment of cooperative marketing alliances to enhance value chain integration.

Thus, with a systematic approach and comprehensive support, cooperatives can serve as a sustainable mechanism for enhancing the efficiency of dairy production and improving the living standards of the rural population in the Turkestan region. It is also important to note that no sales of raw milk were recorded in the Keles, Ordabasy, Suzak, and Shardara districts, which may indicate the absence of cooperative-based dairy production in these areas. Contributing factors include underdeveloped infrastructure for milk processing and logistics, as well as the presence of alternative milk distribution channels. These conditions may influence the pricing structure of milk and dairy products. According to data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, the average price of raw cow milk in the Turkestan region in 2024 amounted to 146.1 thousand tenge per ton. The highest price was observed in the Baydibek district – 178.7 thousand tenge per ton - while the lowest was recorded in the Saryagash district, at 149.7 thousand tenge per ton. The authors suggest that this price variance may be attributed to differences in milk quality, logistical costs, or the level of market competetion (Regions of Kazakhstan in 2024…) [12].

The above analysis reveals a clear imbalance in raw milk production, with approximately 80% of marketed milk concentrated in the Sayram district. This concentration highlights the urgent need to expand dairy cooperation in other districts of the Turkestan region. The analysis of milk sales volume further indicates low diversification in raw milk production, as the majority of districts do not engage in cooperative-based dairy production. This reflects a generally low level of cooperative integration among farmers. To identify the key challenges and constraints to the development of dairy cooperatives, a SWOT-analysis was conducted (table 5).

Table 5 – SWOT-analysis of dairy cooperative development based on small-scale farming cooperation in Turkestan region

Strength	Weaknesses
− favorable climatic conditions for cattle breeding; − cattle breeding tradition; − farm adaptability and flexibility; − financial government support.	− limited access to technology, innovation and financial resources; − low labor productivity; − lack of competencies and knowledge for the development of cooperatives; − partial or complete lack of infrastructure; − high fragmentation of farms.
Opportunity	Threats
− development of the domestic dairy market; − export potential of milk and dairy products; − attracting investments through the development of cooperation in the region; − application of technologies, ai tools for farm management; − expansion of state support for the development of agricultural cooperatives.	− climatic changes (flooding, drought, etc.); − growth in the position of large agricultural holdings; − tightening of sanitary and veterinary requirements; − population urbanization in the region; − volatility of prices for feed and fuel, and electricity; − imports of dairy products.
Note: developed be the authors	

Table 5 illustrates that the development of dairy cattle farming based on the cooperation of household farms presents several strengths. These include favorable climatic conditions for cattle breeding, the adaptive capacity and flexibility of smallholder farmers, among others. It is important to emphasize that livestock farming is a traditional occupation that aligns with the historical and cultural characteristics of the Turkestan region. Small-scale agricultural producers possess the ability to adapt rapidly to both internal and external factors, including rapidly changing market conditions.

Since 2015, Kazakhstan has implemented state support measures aimed at promoting the development of agricultural cooperatives in the regions through programs involving subsidies, concessional loans, and preferential policies. As such, favorable institutional and economic conditions have been established for the full-scale functioning of cooperatives. The consolidation of household farms into cooperative structures holds the potential to significantly reduce production and marketing costs for farmers-particularly in areas such as infrastructure development, logistics, and product marketing-thereby enhancing the economic efficiency of milk production and distribution.

Discussion

The conducted research has identified a number of limiting factors hindering the development of dairy cooperatives in Turkestan region. Small-scale farms, in particular, face significant financial constraints in acquiring modern equipment and essential technological tools. The continued use of outdated machinery by farmers results in reduced labor productivity and weakens the overall competitiveness of agricultural enterprises. Furthermore, there is a notable underdevelopment - or complete absence - of milk processing facilities, transport infrastructure, and adequate systems for the storage of raw milk and dairy products. A considerable number of farmers lack knowledge of modern technologies, including artificial intelligence, as well as essential management competencies. The administrative management of agricultural cooperatives is further complicated by the geographical dispersion and fragmentation of smallholder farms across Turkestan region (Kumari S., Bharti N., Tripathy K.K.) [16].

The development of dairy-focused agricultural cooperatives holds significant potential for increasing milk production volumes and strengthening the domestic supply of dairy products. This would, in turn, contribute to a reduction in imports from countries such as Russia, - Belarus, and Kyrgyzstan. At the same time, expanded milk production by cooperatives would open up opportunities for increased exports to neighboring countries, including Uzbekistan and Kyrgyzstan. Moreover, the advancement of agricultural cooperatives in Turkestan region may become an attractive sector for investment. Members of cooperatives would gain improved access to national programs, grants, and development projects, as well as to preferential credit and subsidy schemes, thereby enhancing the long-term sustainability and economic viability of the sector. Despite the potential for developing dairy cooperatives, their progress may be hindered by climate risks, regulatory burdens, urbanization-driven labor shortages, and growing competition from large agro-industrial enterprises.

Conclusion

The effective development of dairy cattle farming in Turkestan region, based on the cooperation of small-scale agricultural producers, requires the implementation of several strategic measures:

1. It is essential to establish regional Competence Centers that will provide farmers with educational and advisory services. These centers should assist cooperatives by offering standard documentation packages necessary for their legal registration and initial operations.

2. The role of Coordinating Councils under regional administrations should be strengthened. These councils are expected to oversee the development of agricultural cooperation, monitor cooperative activities, and help address practical and organizational issues faced by farmers.

3. A stable financial support framework must be introduced, which includes guarantees through regional financial institutions, access to state subsidies and microloans, expansion of equipment leasing schemes, and the allocation of grants aimed at improving the material and technical base of agricultural cooperatives.

4. Promote digital transformation in cooperative management by introducing electronic platforms for record-keeping, marketing coordination, and supply chain monitoring. This will enhance transparency, reduce transaction costs, and improve decision-making efficiency across all levels of cooperative operations.

5. Encourage diversification of cooperative activities beyond primary milk production by developing value-added processing, introducing new dairy product lines, and exploring niche markets such as organic or functional dairy products. Such diversification can strengthen market resilience and increase profitability.

Authors' contribution: Yesbolova Ainur Yergazievna: conceptualization, coordination of the research, writing the article, interpretation of the research results; de la Poza Plaza

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Elena: the literature review on the research topic, selection of the methodology; Abdikerimova Gulzhanar Imanbaevna: data analysis and the synthesis of the study's findings.

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