ISSN 2224-526X

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ
Қазақ ұлттық аграрлық университеті

Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН
Казахский национальный
аграрный университет

IZVESTIÂ

NATIONAL'NOJ AKADEMII NAUK
RESPUBLIKI KAZAHSTAN
Kazakh National
Agrarian University

SERIÂ AGRARNYH NAUK

1 (55)

JANUARY – FEBRUARY 2020

PUBLISHED SINCE JANUARY 2011

PUBLISHED 6 TIMES A YEAR

ALMATY, NAS RK

«ҚР ҰҒА Хабарлары. Аграрлық ғылымдар сериясы».
ISSN 2224-526X
Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» РҚБ (Алматы қ.).
Қазақстан республикасының Мәдениет пен ақпарат министрлігінің Ақпарат және мұрағат комитетінде 30.04.2010 ж. берілген **№ 10895-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік.

Мерзімділігі: жылына 6 рет.
Тиражы: 300 дана.

Редакцияның мекенжайы: 050010, Алматы қ., Шевченко көш., 28; 219, 220 бөл.; тел.: 272-13-19, 272-13-18;
http://agricultural.kz/index.php/en/

Типографияның мекенжайы: «NurNaz GRACE», Алматы қ., Рысқұлов көш., 103.

Известия Национальной академии наук Республики Казахстан. Серия аграрных наук.
ISSN 2224-526X
Собственник: РОО «Национальная академия наук Республики Казахстан» (г. Алматы).
Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан **№ 10895-Ж**, выданное 30.04.2010 г.

Периодичность 6 раз в год.
Тираж: 300 экземпляров.

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28; ком. 219-220; тел. 272-13-19, 272-13-18;
http://agricultural.kz/index.php/en/

Адрес типографии: ИП «NurNazGRACE», г. Алматы, ул. Рыскулова, 103

News of the National Academy of Sciences of the Republic of Kazakhstan. Series of Agrarian Sciences.
ISSN 2224-526X
Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty).
The certificate of registration of a periodic printed publication in the Committee of Information and Archives of the Ministry of Culture and Information of the Republic of Kazakhstan N 10895-Ж, issued 30.04.2010.

Periodicity: 6 times a year.
Circulation: 300 copies.

Editorial address: 28, Shevchenko str., of. 219-220, Almaty, 050010; tel. 272-13-19, 272-13-18;
http://nauka-nanrk.kz / agricultural.kz

Address of printing house: «NurNaz GRACE», 103, Ryskulov str, Almaty

N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF AGRICULTURAL SCIENCES
ISSN 2224-526X
Volume 1, Number 55 (2020), 25 – 30 **https://doi.org/10.32014/2020.2224-526X.4**

MRNTI 55.66.31.
UDC 631.363

T. Abilzhanuly, D. T. Abilzhanov, T. A. Smagulov, D. N. Orazakhyn

"Scientific Production Center of Agricultural Engineering " LLP,
Almaty, Kazakhstan.
E-mail: abilzhanuly.kazniimesh@mail.ru, r16dan@mail.ru

RESULTS OF TESTS ON THE STALK AND GRAIN CRUSHER OF A SMALL FODDER SHOP

Abstract. It is known that in Kazakhstan, 70 ... 80 percent of peasant farms have no more than 100 head of cattle and 500 head of sheep. To fatten these farms and to prepare a complete ration with combined feed in dairy farms, a distributer-mixer with a box with a capacity of 3 ... 5 m^3 is needed.

Since the equipment of these distributer-mixer machines with stalk and grain crushers ensures that it chops fodder itself and loads them onto a hay rye and grain warehouse of a mobile fodder shop, in the process of preparing a full ration of a combined feed, the number of operations will be reduced by 1.67 times, and the operating costs of the unit will be reduced by 1.5 times. In addition, if the stalk fodder is crushed by zootechnical requirements, i.e. 30 to 50 mm, then the uniformity of the mixing process increases. Here you can mix with the addition of nutrient feed in the preparation of the combined feed, that is, the use of a mobile fodder shop in the household allows you to carry out the process of preparing a combined feed using new and inexpensive technologies, i.e. the use of a mobile fodder shop equipped with special crushers is a technological innovation.

At present, the “Scientific Production Center of Agroengineering” on small farms is developing a mobile fodder shop for the preparation and distribution of compound feeds with a capacity of 5.0 m^3, equipped with crushers for stalk and croup. In addition, in order to simplify the drive to the crusher and to make the design simple, the crusher of the stalk and grain are equipped with one bucket, that is, this is a technical novelty of the mobile fodder shop.

Stalk and grain crushers of mobile fodder shops were made and tested. During the tests, the productivity of the stalk chopper is 2.5 ... 3.0 t/h, the power consumption is 6.2...7.0 kW, and the productivity of the grain crusher is 750 - 900 kg/h, and it was found that the power consumption in the performance range will be between 5.1 ... 7.2 kW. It was proved that the size of the crushed stalk and grain meets zootechnical requirements.

Key words: mobile fodder shop, stalk crusher, grain crusher, distributer-mixer, productivity of crushers, quality of crushed fodder.

Introduction. Currently, in Kazakhstan, 90% of cattle and 95% of sheep belong to the individual farm and the peasant farm. 70 ... 80 percent of peasant farms have no more than 50 ... 100 head of cattle and 500 head of sheep, which means that our farms are small and have fewer opportunities. That is why our farms should be equipped with appropriate universal equipment.

It is known that the development of the processes of preparation, preparation and distribution full rationale of food is associated with the development of new machines and mechanisms.

In livestock farms of leading foreign countries special distributer-mixer machines are used for mixing and distributing the complete ration of the combined feed. The leading manufacturers of these machines abroad are companies from Italy, Germany and France. For example, the Italian company AGM manufactures a distributer-mixer with a box with a capacity from 4.0 to 20.0 m^3 [1].

In the factories of Russia and the Republic of Belarus, the manufacture of machines with a box with a capacity of 6.0 ... 12.0 m^3 was released [2....7].

The problem of feed preparation was also a serious problem in the studies of foreign scientists. Their research examines the preparation of silage, the preparation of a combined feed, nutrient feed and premixes [8....13].

To optimize the parameters of the distributer-mixer, scientists are engaged in theoretical and practical research [14....16].

In addition, it was determined that when feeding livestock with a full ration of a combined feed, livestock productivity will increase by 9.0 ... 30.0%, and the feed consumption that is spent on getting 1 centner of milk will decrease by 7.0 ... 8, 0% [17].

Distributer-mixer machines in foreign countries are very expensive (16000 ... 61000 euros), and the distributer-mixer of the Republic of Belarus with a box volume of 6.0 m3, which itself has a price of more than 6.0 million.

Since our farms have about 100 head of cattle, the volume of the combined feed that is made per day is 3.0 tons, that is, this is the norm of one-day feed, which is distributed separately 3 times or 2 times. Here, the amount of combined feed of which is distributed once, in the case of distribution 3 times is 1 ton, and when 2 times it is 1.5 tons.

Since the density of the combined feed, which consists of crushed grass, silage and nutrient feed is about 340 kg/m^3 [18], for our farms the volume of the distributor-mixer box should be from 3.0 to 5.0 m^3.

At the same time, we offer technological innovations for the preparation and distribution of complete feed rations in farms, that is, equipping these small distributors-mixers with special crushers for grass and grain, which are obtained from the power take-off shaft of a driving tractor mounted on its frame. In this case, the distributor-mixer turns into a mobile fodder shop for preparing food for livestock.

The augers of many distributors-mixers are equipped with a knife, which provides their approximate grinding of stalk feed. However, grinding grass with a mixer's auger does not meet zootechnical requirements. Here the average length of the crushed stalk is 100...150 mm. If the grass is crushed to 30-50 mm in length in accordance with the zootechnical requirements, and the longest sections do not exceed 100 mm, then it is determined that when feeding cattle, its daily weight adds up to 35% [19].

In addition, mixing the grass in a mixer with a diameter of 30 to 50 mm allows the mixing process to go through high uniformity, that is, it gives the opportunity to add nutritious feed to the mixer and not require special crushers and feed aggregates for the farms, i.e., it turned out that the distributors-mixers with crushers are beneficial to farms.

Organizing large quantities of dairy and livestock farms in such small farms, the manufacture and introduction of universal equipment for the production of complete combined feed, is the main focus of the problem of livestock development and ensuring food security of the population.

Methods of research. The productivity and crushing capacity of crushers during the test was determined by agricultural machinery testing and one-factor experimental researches [20].

The results of research and their examination. On the farms a mobile small fodder shop is being developed at the Scientific Production Center of Agroengineering for the production of complete rations of combined feed (grass, silage and fodder) for livestock.

This fodder shop consists of a distributor-mixer with a volume of 5 m^3 and stalk and grain crushers installed on the same shaft. When using a foreign distributor-mixer of which is released at this time, stalk and grain are ground and delivered to the finished fodder shop, and feeding operations are performed. And the mobile fodder shop, equipped with our special crushers, goes to the place where grass accumulates, where the grass will be chopped and immediately loaded into the fodder shop box, and here the chopping of the feed is carried out by the grinder, and the it can be loaded by the crusher's deflector.

Thus, using such a mobile fodder shop, the number of operations will be reduced by 1.67 times, and the unit operating costs for the preparation of the combined feed will be reduced by 1.5 times, that is, the technological novelty of using a mobile fodder shop, the introduction of the latest experimental model of such a mobile shop is carried out as part of the project of the Ministry of Education and Science of the Republic of Kazakhstan No. AR 05131525 "reasonably make the newest experimental technology model for production and distribution feed for small farms and small mobile fodder shops" for 2018-2019.

At present, a distributor-mixer of a small fodder shop has been developed and its basic parameters are optimized [22].

To equip the mobile fodder shop with a feed crusher, the option of chopping the feed with the universal grinder DU-11 was chosen, and to simplify the drive for the crushers and the simplicity of their design, a special grinder was installed at the end of the feed crusher shaft, that is, this is a technical novelty of the mobile fodder shop (figure 1).

First of all, it was planned to make stalk and grain crushers for mobile small fodder shops, and test them.

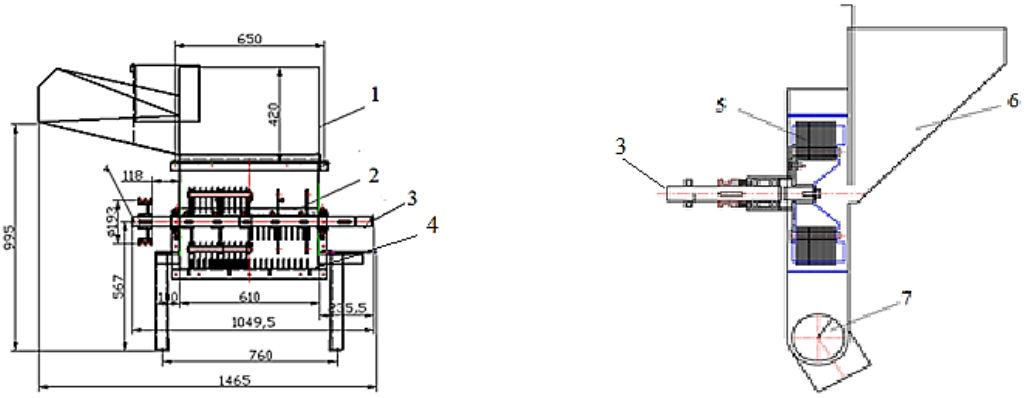

Figure 1 – Constructive-technological scheme of the stalk and grain crushers installed on a single shaft:
1 – stalk feed box, 2 – stalk chopping rotor, 3 – crusher shaft, 4 – row of fenders, 5 – grain chopping rotor,
6 – grain feed box, 7 – auger for ejection of chopped feed

During the test to measure the crusher's performance and its energy efficiency, the rotor of the crusher was put into operation by an electric motor with a power of 7.5 kW, and a belt conveyor was used in the stalk crusher for a specific performance (figure 2).

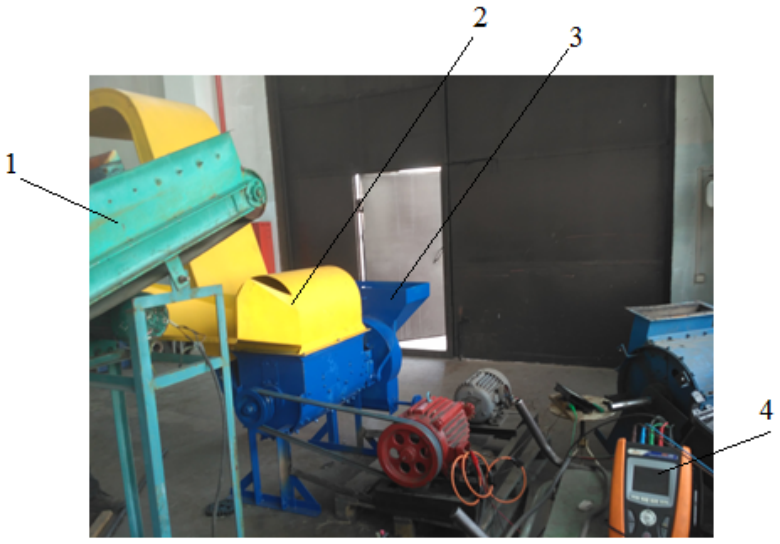

Figure 2 – Installation for testing:
1 – belt conveyor, 2 – stalk feed crusher, 3 – grain feed crusher, 4 – PQA-824 *power quality* analyzer

The productivity of grass delivery to the crusher in the experimental period was regulated by applying a known mass of grass to each meter of the distributor-mixer.

In fact, pressed grass is delivered to the crusher. Here, after receiving a string of grass from a tiny pressed grass, it is divided into parts that have a mass of from 2.0 to 2.5 kg. When these parts are delivered to the crusher, they are ground in about 3 seconds, i.e. the productivity of the crusher at this time is 2.5...3.0 t/h.

Based on the situation when the crusher operates with a productivity of 2.5 ... 3.0 t/h, it was determined that its power consumption will be 6.2 ... 7.0 kW, that is, during the test it was fully proved that crusher with such productivity works evenly and without problems.

During the test, the mass of grass with 17% humidity, with different content was crushed. For grinding grass in accordance with the zootechnical requirements, four rows of fenders were installed in the crushing chamber, i.e. the fenders in the first and second rows were set in 50 mm steps, and in 3 and 4 rows - 25 mm.

As a result of this set of fenders, chopped grass with a length of up to 30 mm was 87.22%, and chopped grass with a length of 50 mm was 93.98%, that is, larger than 50 mm with a length of 6.02%.

Zootechnical requirements for chopping stalk feed should be chopped with a length of 20...30 mm for sheep, and with a length of 30...50 mm for cattle, and the weight of grass crushed with such a length should not be less than 80% and cuts with a length of more than 50 mm should not exceed 10% [18].

It was determined that the quality of the mass fraction of ground grass by size meets the zootechnical requirements in the crusher.

Since the rotor in this grinding machine is installed at the end of the rotor for crushing the stalk feed, a box for feeding grain into the crushing chamber is installed on the chamber lid and is fed through the center of the crushing chamber.

The performance measure was changed by adjusting the measures of the feed holes in the crushing chamber using a special cover.

During the test, it was established that the productivity of the crusher with stationary power consumption in normal conditions is 750...900 kg/h, and during the work with this productivity, the power is 5.1...7.2 kW.

For grain crushing in the crushing chamber there is a strainer with holes with a diameter of 6 mm. It was determined that 85% of the crushed barley with a size of 1.0...2.6 mm; average diameter of 1.4 mm, unground grain - 0.4%.

According to zootechnical requirements, the size of crushing grain for sheep should be 1.0...1.6 mm, and for cattle - from 1.8 to 2.6 mm [18].

The size of unground grain should not exceed 0.5%. At the same time, the quality of the feed grinder and the crushing of grain feed meets the technical requirements for cattle and sheep.

In the case of housekeeping, you can adjust the size of the crushed grain in the crushing chamber using a strainer with 4.5, 6 mm holes, which means that the machine has the ability to adjust the total weight of grain supply depending on the type of livestock.

Conclusion. 1. Since 70...80 percent of the head of cattle and 500 head of sheep in our country have no more than 100, for these farms the “Scientific Production Center of Agroengineering” develops a mobile fodder shop equipped with stalk and grain crushers with bunker with a capacity of 5,0 м^3, which is intended for the distribution of the combined feed on farms.

Since this fodder shop itself goes on a hay bale and to a grain feed warehouse, and ensures that the feed is loaded into the box, shredding it, it was found that the number of operations on the preparation of the combined feed decreased by 1.67 times, and the operating expenses decreased by 1.5 times compared to distributors-mixers, not equipped with former crushers, i.e. the use of such a fodder shop is a technological innovation.

At the same time, the chopper was installed in such a way as to facilitate the drive to the chopper and simplify its design.

2. Stalk and grain crushers of mobile fodder shops were made and tested. During the tests, the productivity of the stalk chopper is 2.5...3.0 t/h, the power consumption is 6.2...7.0 kW, and it was proved that the quality of the crushed stalk and grain meets zootechnical requirements.

3. The productivity of the grain crusher is 750-900 kg/h, and it was found that the power consumption in the performance range will be between 5.1...7.2 kW, and it was proved that the size of the crushed stalk and grain meets zootechnical requirements.

Т. Әбілжанұлы, Д. Т. Абилжанов, Т. А. Смагулов, Д. Н. Оразахын

«Агроинженерия ғылыми-өндірістік орталығы» ЖШС, Алматы, Қазақстан

ШАҒЫН АЗЫҚ ЦЕХІНІҢ ҰСАҚТАҒЫШТАРЫНА ЖҮРГІЗІЛГЕН СЫНАҚ НӘТИЖЕЛЕРІ

Аннотация. Қазақстанда шаруа қожалықтарының 70...80 пайызында ірі қараның саны 100 бастан, ал қойдың саны 500 бастан аспайтыны белгілі. Осындай қожалықтардың бордақылау және сүт фермаларында толық рационды араласазық дайындап тарату үшін қорабының көлемі 3...5 м^3 болатын араластарғыш-таратқыштар керек.

Бұл араластырғыш-таратқыштарды сабақты және дәнді азық ұсақтағыштарымен жабдықтау жылжымалы азық цехінің шөп маясына және дәнді азық қоймасына өзі барып азықтарды ұсақтап тиеуді қамтамасыз ететін болғандықтан толық рационды араласазық дайындау процессінде операциялардың саны 1,67 есеге, ал бірлік эксплуатациялық шығын 1,5 есеге азаяды. Сонымен қатар, сабақты азық зоотехникалық талапқа сай, яғни 30...50 мм-лік ұзындықпен ұсақталған болса, онда араластыру процессінің біркелкілігі артады. Мұнда араласазық дайындағанда құнарлы құрамажем (комбикорм) қосып араластыруға болады. Шаруашылықта жылжымалы азық цехін пайдалану араласазық дайындау процессін жаңа және шығыны аз технологиямен іске асыруға мүмкіншілік береді, яғни арнаулы ұсақтағыштарымен жабдықталған мүндай жылжымалы цехті пайдалану технологиялық жаңалық.

Қазіргі уақытта «Агроинженерия ғылыми-өндірістік орталығында» шағын шаруашылықтарға қорабының көлемі 5,0 м^3 болатын, сабақты және дәнді азық ұсақтағыштарымен жабдықталған араласазық дайындауға және таратуға арналған жылжымалы азық цехі жасалу үстінде. Сонымен қатар ұсақтағыштарға жетек беруді жеңілдету және олардың құрылымының қарапайым болуы үшін сабақты және дәнді азық ұсақтағыштары бір білікке орнатылған, яғни бұл жылжымалы цехтің техникалық жаңалығы.

Жылжымалы цехтің сабақты және дәнді азық, ұсақтағыштары жасалып, оларға сынақ жіргізілді. Сынақ барысында сабақты азық ұсақтағыштың өнімділігі 2,5...3,0 т/сағ., прроцесске жұмсалатын қуат 6,2...7,0 кВт, ал дәнді азық уатқыштың өнімділігі 750...900 кг/сағ., осы өнімділікпен жұмыс істегенде жұмсалатын қуат шамасы 5,1...7,2 кВт аралығында болатыны, анықталды. Ұсақталған сабақты және дәнді азықтың ірілігі зотехникалық талапқа сай екені дәлелденді.

Түйін сөздер: жылжымалы азық цехі, сабақты азық ұсақтағышы, дәнді азық ұсақтағышы, араластырғыш-таратқыш , ұсақтағыштар өнімділігі, ұсақталған азық сапасы.

Т. Әбілжанұлы, Д. Т. Абилжанов, Т. А. Смагулов, Д. Н. Оразахын

ТОО «Научно-производственный центр агроинженерии», Алматы, Казахстан

РЕЗУЛЬТАТЫ ИСПЫТАНИЙ ИЗМЕЛЬЧИТЕЛЕЙ МИНИКОРМОЦЕХА

Аннотация. В Казахстане 70…80% крестьянских хозяйств содержат до 100 голов крупного рогатого скота и до 500 голов овец. В откормочных и молочных фермах этих хозяйств для приготовления полнорационных кормосмесей целесообразно использовать раздатчик-смеситель кормов с объемом бункера 3…5 м^3, а также снабжение раздатчика-смесителя измельчителями грубых и зерновых кормов превращает машину в передвижной миникормоцех. При этом кормоцех сам подъезжает к скирде и к складу зерновых кормов, обеспечивая измельчение и погрузку кормов в бункер кормоцеха, т.е. в процессе приготовления полнорационных кормосмесей количество операцией сокращается в 1,67 раза и снижаются удельные эксплуатационные затраты в 1,5 раза. Кроме того, измельчение стебельных кормов соответствует зоотехническим требованиями, т.е. с длиной резки 30…50 мм. Это обеспечивает повышение однородности смеси при смешивании кормов и позволяет вводить в состав кормосмеси комбикорма, т.е. использование такого передвижного кормоцеха в хозяйстве обеспечивает проведение процесса приготовления кормосмеси по новой и экономичной технологии, следовательно, данная разработка имеет технологическую новизну.

В настоящее время в «Научно-производственном центре агро-инженерии» разрабатывается передвижной кормоцех для приготовления и раздачи кормосмесей в условиях малых крестьянских хозяйств. Он состоит из бункера объемом 5,0 м^3 и измельчителей грубых и зерновых кормов. Кроме того, для облегчения передачи привода и упрощения конструкции, роторы измельчителей грубых и зерновых кормов установлены на одном валу, что является *технической новизной разработки.*

В настоящее время изготовлены измельчители грубых и зерновых кормов. Проведены их испытания. Результаты испытаний показали, что измельчитель грубых кормов имеет производительность 2,5...3,0 т/ч, а затрачиваемая мощность была в пределах 6,2...7,0 кВт. При этом также установлено, что производительность дробилки зерновых кормов была в пределах 750...900 кг/ч, а потребляемая мощность находилась в пределах 5,1...7,2 кВт. Качество измельченных грубых и зерновых кормов соответствует зоотехническим требованиям.

Ключевые слова: передвижной кормоцех, измельчитель грубых кормов, измельчитель зерновых кормов, раздатчик-смеситель кормов, производительность измельчителей кормов, качество измельченных кормов.

Information about authors:

Abilzhanuly T., «Scientific Production Center of Agricultural Engineering» LLP, Almaty, Kazakhstan; abilzhanuly.kazniimesh@mail.ru; https://orcid.org/0000-0002-9513-1702

Abilzhanov D.T., «Scientific Production Center of Agricultural Engineering» LLP, Almaty, Kazakhstan; r16dan@mail.ru; https://orcid.org/0000-0002-7780-7692

Smagulov T.A., «Scientific Production Center of Agricultural Engineering» LLP, Almaty, Kazakhstan; smagulov_60_60@mail.ru ; https://orcid.org/0000-0002-9859-3339

Orazakhyn D.N., «Scientific Production Center of Agricultural Engineering» LLP, Almaty, Kazakhstan; darhan.suan@mail.ru; https://orcid.org/0000-0002-5251-7584

REFERENCES

[1] Kantureyev M.T. Development of fodder production in Kazakhstan //News of the National academy of sciences of the Republic of Kazakhstan. Series of agricultural sciences. 2019. N 1. P. 51–55. ISSN 2224-526X. https://doi.org/10.32014/2019.2224-526X.7

[2] Ilyin I.V. Trends in the development of technology for livestock and fodder production // Tractors and agricultural machines. 1996. N 8. P. 1-9.

[3] For large farms: Self-propelled fodder mixers // New agriculture. 2005. N 1. P. 82–89.

[4] Food room on wheels KIS-8, KIS-9, KIS-10: avenue. –Novosibirsk's Experimental Plant of Non-Standard Equipment. 1 p.

[5] Frolov V.Yu., Sysoev D.P. Optimization of feed preparation processes by distributor-mixer // Technique and equipment for the village. 2011. N 2. P. 22–23.

[6] Sysoyev D.P., V.Yu. Frolov / Improving the working body of the feed dispenser // Technique in agriculture. 2009. N 5. P. 12–15.

[7] Sysoyev D.P., V.Yu. Frolov / Experimental aspects of optimizing the process of feed preparation with a shredder-mixer // Mechanization and Electrification of Agriculture. 2009. N 10. P. 16–18.

[8] Tishchenko M.A., Braginets S.V., Klimenko V.I. Combined machine for the preparation and distribution of feed // Rural mechanic. 2010. N 11. P. 22–23.

[9] Impact Factor: 1.359/Development of safer fooder-cutter machines: a case study from north India/ Original Research Article Safety Science, Vol. 42, Issue 1, January 2004, P. 43-55 / Dinesh Mohan, Adarsh Kumar, Rajesh Patel, Mathew Varghese.

[10] Impact Factor: 1.249 / Effect of supplementing napier grass with desmodium and lucerne on DM, CP and NDF intake and weight gains in dairy heifers Original Research Article Livestock Production Science, Vol. 60, Issue 1, 1 July 1999, P. 81-88 / J.N. Kariuki, G.K. Gitau, C.K. Gachuiri, S. Tamminga, J.M.K. Muia.

[11] Impact Factor: 3.651 / Energy use and economic analysis of corn silage production under three cultivated area levels in Tehran province of Iran Original Research Article/ Energy, Vol. 36, Issue 5, May 2011, P. 3335-3341 / S.H. Pishgar Komleh, A. Keyhani, Sh. Rafiee.

[12] Impact Factor: 2.566 / Effect of corn silage harvest maturity and concentrate type on milk fatty acid composition of dairy cows Original Research ArticleJournal of Dairy Science, Vol. 95, Issue 3, March 2012, P. 1472-1483 / N.A. Khan, T.A. Tewoldebrhan, R.L.G. Zom, J.W. Cone, W.H. Hendriks.

[13] Impact Factor: 1.608 / Postruminal degradation of crude protein, neutral detergent fibre and starch of maize and grass silage in dairy cows Original Research Article Animal Feed Science and Technology, Vol. 177, Issues 3–4, 8 November 2012, P. 172-179 / M. Ali, M.R. Weisbjerg, J.W. Cone, G. van Duinkerken, M.C. Blok, M. Bruinenberg.

[14] Review on Crucial Parameters of silage Quality Original Research Article APCBEE Procedia, Vol. 3, 2012. P. 99-103 / S.H. Mohd-Setapar, N. Abd-Talib, R. Aziz.

[15] Konovalov V.V., Vlasov A.A. Calculation of the mixing chamber in the interaction of flows of dry and liquid components // Achievements of science and technology of agriculture. 2003. N 9. P. 29-30.

[16] Bakin I.A., Belousov G.N. Stochastic approach to assessing the quality of mixing bulk materials in centrifugal mixers // Storage and processing of agricultural raw materials. 2010. 7t. P. 58-61.

[17] Kolobov M.Yu., Sakharov S.E., Kolobova V.V. Dry feed mixer // Feed production. 2011. N 5. P. 46-48.

[18] Frolov V.Yu., Priporov I.E., Sysoev D.P. Classification of technical means for the preparation and distribution of feed mixtures on small cattle farms //Polytematic network electronic scientific journal of the Kuban State Agrarian University. 2015.

[19] Kulakovsky I.V., Kirpichnikov F.S., Reznik E.I. Machines and equipment for the preparation of feed: a Handbook. M.: Roselekhozdat, 1987. 285 p.

[20] Walton Peter D. Production of forage crops / Per. from English I.M. Spichkina; by ed. A.N. Likhachev. M.: Agropromizdat, 1986. 286 p. with illustrations.

[21] Atykhanov A.K., Abilzhanuly T., Zhortuylov O. " Fundamentals of scientific research." Almaty: "Agrouniversity", 2012. 10 b.

[22] Abilzhanuly T., Abilzhanov D.T., Naidenko E.V., Smagulov T.A., Bulanov A.T. Justification of the preparation of feed mixture in small farms //International agroengineering. 2018. N 3. P. 6-13.

[23] Abilzhanov D.T., Abilzhanuly T., Uteshev V.L., Naidenko E.V., Bulanov A.T. Substantiation of parameters of a small-sized feed distributer-mixer // International Agroengineering. 2018. N 2. P. 15-22.

Publication Ethics and Publication Malpractice
in the journals of the National Academy of Sciences of the Republic of Kazakhstan

For information on Ethics in publishing and Ethical guidelines for journal publication see http://www.elsevier.com/publishingethics and http://www.elsevier.com/journal-authors/ethics.

Submission of an article to the National Academy of Sciences of the Republic of Kazakhstan implies that the described work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see http://www.elsevier.com/postingpolicy), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. In particular, translations into English of papers already published in another language are not accepted.

No other forms of scientific misconduct are allowed, such as plagiarism, falsification, fraudulent data, incorrect interpretation of other works, incorrect citations, etc. The National Academy of Sciences of the Republic of Kazakhstan follows the Code of Conduct of the Committee on Publication Ethics (COPE), and follows the COPE Flowcharts for Resolving Cases of Suspected Misconduct (http://publicationethics.org/files/u2/New_Code.pdf). To verify originality, your article may be checked by the Cross Check originality detection service http://www.elsevier.com/editors/plagdetect.

The authors are obliged to participate in peer review process and be ready to provide corrections, clarifications, retractions and apologies when needed. All authors of a paper should have significantly contributed to the research.

The reviewers should provide objective judgments and should point out relevant published works which are not yet cited. Reviewed articles should be treated confidentially. The reviewers will be chosen in such a way that there is no conflict of interests with respect to the research, the authors and/or the research funders.

The editors have complete responsibility and authority to reject or accept a paper, and they will only accept a paper when reasonably certain. They will preserve anonymity of reviewers and promote publication of corrections, clarifications, retractions and apologies when needed. The acceptance of a paper automatically implies the copyright transfer to the National Academy of Sciences of the Republic of Kazakhstan.

The Editorial Board of the National Academy of Sciences of the Republic of Kazakhstan will monitor and safeguard publishing ethics.

Правила оформления статьи для публикации в журнале смотреть на сайте:

www:nauka-nanrk.kz

http://agricultural.kz/index.php/en/

Редактор *М. С. Ахметова, Т. М. Апендиев, Д. С. Аленов*
Верстка на компьютере *Д. А. Абдрахимовой*

Подписано в печать 11.02.2020.
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
2,9 п.л. Тираж 300. Заказ 1.