МЕХАНИЗАЦИЯ И ЭЛЕКТРИФИКАЦИЯ СЕЛЬСКОГО ХОЗЯЙСТВА

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METHODOLOGICAL AND TECHNOLOGICAL PROBLEMS OF OPTIMIZATION PRESCRIPTION VALUES OF "TARGETED" HIGH-FEED FOR ANIMALS

Abstract. It is well known that feed production takes place under conditions of a priori uncertainty. Calculation function recipes becomes mandatory step process feed production. The factors leading to the need to consider the feed production process as transient, for which transients at the beginning and end of production is comparable or equal to the time of stationary. All this translates into feed production process with a guaranteed nutritional value in discharge probability problems.

Keywords: feed, methodology, optimization, uncertainty, error, raw materials, information model.

Introduction. High quality feed is a complex industrial product which is characterized by a variety of factors: the content of individual components 15-18, 12-14 content indicators nutrient content of 8-12 kinds of vitamins, 5-6 kinds of trace elements, more than 3-5 types of dietary supplements, uniformity of composition [1, 2].

The main scientific and technical challenge for feed businesses is to provide guaranteed quality of the finished product on the whole range of indicators.

One of the most important indicators in the production of feed is a wide range of raw materials used.

In practice, the fodder production is used more than 150 kinds of organic feed ingredients and mineral origin - carriers of energy, nutrients and chemical elements, about 20 kinds of vitamins, about 10 kinds of trace elements, and dozens of varieties of enzyme drugs adsorbing additives, antioxidants and other substances [2,3].

Most feed ingredients supplied without specialized product training to ensure stability in their nutritional indicators as the main limiting factor in the use of different raw materials in compound feed is determined solely by their safety, but not indicators of nutritional value.

This fact defines a wide range of variation in the nutrient content of different batches of raw material. Actually feed production takes place under conditions of a priori uncertainty about some indicators similar nutritional source of raw materials [4].

The stability of quality is also influenced by chemical methods of analysis error in determining the nutritional raw materials. The commercially available feed on its nutritional value even for the same age groups of animals differ.

Results. Our studies in the laboratory BPH "Center of physicochemical methods of research and analysis, "Kazakh National University Al-Farabi and the laboratory" Kazgeoanalitika" on the chemical composition of different batches of raw material differ in nutritional value [5].

All this makes it necessary to calculate the component composition of feed (prescription) for almost every new batch. Calculation function recipes becomes mandatory step process feed production.

So according to our research, used by feed mills processing equipment has ultimate performance metering accuracy and uniformity of mixing. It should be noted that frequent changes of recipes (for a change, the company produces batches of different fodder 3-5) and small batch sizes do not allow technicians to efficiently customize equipment for manufactured products, which also complicates the problem of ensuring consistent quality of finished products [5].

Next on the feed mill limited operational capability of adjusting the recipe in its production process for many reasons. This is due to the length of time required to obtain information about

compliance or non - performance of the actual nutritional value of feed produced the required values, the complexity of the process associated with a possible change in the composition of raw materials in the recipe, as well as the complexity of the approval decisions of the recipe.

These factors lead to the need to examine the feed production process as a transient, for which transients at the beginning and end of production is comparable or equal to the time of stationary.

All this translates into feed production process with a guaranteed nutritional value in discharge probability problems.

At the same time the modern breed animals can realize inherent genetic potential productivity only by providing them with high-quality forages, exactly balanced by key indicators of nutritional value, vitamins and trace element composition.

For most animal species is important not only the absolute value of the rations consumed by nutrients and micronutrients, but their ratio to one another.

In the cost structure of livestock production share of fodder takes from 50 to 70 %, so in the face of competition consumers purchase food from vendors who provide the best value for money. In this case the final evaluation of fodder produced after feeding the consumer, based on analysis of increasing the productivity of animals [1,2].

Thus, in the formulation of each batch of feed manufacturer solves the problem of finding such a combination of components which, on the one hand, in the finished product provides the necessary nutrients for the effect of systemic errors in the process, on the other hand - provides price competitiveness of products in foreign market.

So far, the problem of analysis and synthesis recipes with guaranteed fodder nutritional value in conditions of systemic errors in the process of their production is scarcely explored. To solve this problem we have attempted to develop a methodology for optimizing formulations and mixed fodder production with specified consumer properties and guaranteed content in it of essential nutrients that can realize the genetic potential animal productivity and ensure a high level of profitability of livestock production [1,3,5].

During the study we have analyzed the factors affecting the stability of mixed fodder production quality characteristics in the process of its production variations nutritional value of raw materials, manufacturing operations error dosing and mixing error methods of quantitative chemical analysis of raw materials and animal feed; statistical analysis component composition recipes animal feed and to identify the main patterns for different kinds of animals; perform a statistical analysis of the sources of essential nutrients in feeds, to gather information on the variation of indicators of nutritional value in the main types of feed raw materials, a statistical treatment and to evaluate the influence of heterogeneity on the raw material variations nutritional indicators finished products; hold analysis of the characteristics of the process equipment - metering accuracy and uniformity of mixing lines dosing and mixing feed components and evaluate their impact on the variation of nutritional indicators of finished products, to analyze the influence of errors in methods of quantitative chemical analysis of raw materials to feed nutrient variation indices of finished products, to develop mathematical models to estimate variations in indicators of nutritional value of feed mill products during manufacturing in partial priori uncertainty, to develop a methodology for analysis and synthesis recipes mixed fodder production with a guaranteed nutritional value; develop algorithms and software to optimize fodder recipes with nutritional value guaranteed under partial priori uncertainty in the process production of [5].

Based on the studies we have developed a methodology for optimizing formulations and production of "targeted" fodder with guaranteed content in it of essential nutrients in the face of uncertainty and the impact of system errors in the process of its production.

Research results suggest that indicators of nutritional value "targeted" under the influence of animal feed system errors in the production process may deviate from the desired values, the degree of deviation may extend beyond the limits permitted by standardized methods of quantitative analysis.

As the main factors of the process, affecting the stability of indicators of nutritional value of finished products, uncertainty in the assessment of the nutritional value of raw materials, the final accuracy of the metering devices, different homogeneous mixing [1,5].

Theoretical studies allowed us to develop a statistical model parameters nutritional raw materials, including the characteristics of the mean value, standard deviation, coefficient of variation, allowing us to obtain a quantitative estimate of the variations in the finished product when used in the calculation of tabular data. The information model parameters nutritional raw materials, allowing them to assess the degree of uncertainty of a priori and a posteriori, and use this information in the formation of the optimization criteria.

First, a mathematical model for forecasting variations of nutrients in feeds when exposed to systemic errors in the process of their production, the created models are expected variations guaranteed demonstration substances. Adequacy of the model tested in results of chemical analysis of samples of mixed fodders, selected from a number of feed enterprises of Almaty region [5].

Actual deviations from the guaranteed performance nutritional values are within the boundaries of the ranges predicted by the model.

Conclusions. On the basis of the developed model and results developed a methodology to ensure the nutritional value of animal feed guaranteed with a given confidence level in a particular process and available resources. Suggested we have developed algorithms and software to optimize fodder recipes with nutritional value guaranteed under the influence of systemic errors in the process of their production, which revealed patterns of influence systemic error process to the level of quality assurance and animal feed rates.

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МЕТОДОЛОГИЧЕСКИЕ И ТЕХНОЛОГИЧЕСКИЕ ПРОБЛЕМЫ ОПТИМИЗАЦИИ РЕЦЕПТУРНОЙ ЦЕННОСТИ «АДРЕСНЫХ» КОМБИКОРМОВ ДЛЯ ВЫСОКОПРОДУКТИВНЫХ ЖИВОТНЫХ

Общеизвестно, что производство комбикормов происходит в условиях априорной неопределенности. Функция расчета рецептов становится обязательным этапом технологического процесса производства комбикормов. Исследованные факторы приводят к необходимости рассматривать производство комбикормов как процесс нестационарный, для которого время переходных процессов в начале и конце выработки соизмеримо или равно времени установившегося процесса. Все это переводит процесс производства комбикормов с гарантируемой питательной ценностью в разряд вероятностных задач.

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ЖОҒАРЫ ӨНІМДІ МАЛДАРДЫ БОРДАҚЫЛАУҒА АРНАЛҒАН «МЕКЕН-ЖАЙЛЫ» АЗЫҚТЫҢ ҚҰНДЫЛЫҒЫ ТУРАЛЫ ӘДІСТЕМЕЛІК ЖӘНЕ ТЕХНОЛОГИЯЛЫҚ МӘСЕЛЕЛЕРІ

Құрамажем дайындау үрдісі априорлық белгісіз жағдайда өңделетіні жалпыға аян. Азық дайындау технологиялық үрдісінде, репцепті есептеу функциясы міндетті кезең болып саналады. Арнайы жүргізілген есептеу факторы құрамажем дайындау үрдісін станционарлы емес деп қарастыру қажеттілігін ұсынады, өйткені тағайындалған үрдіс, соған кеткен уақыттың басы мен аяғындағы ауысу үрдісіне жуық немесе тең болады. Осының бәрі құрамажем дайындау өндірісіндегі үрдістерде азықтың сіңімді құндылығына кепіл болу тапсырмасы тұр.

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ИССЛЕДОВАНИЕ ТВЕРДОСТИ ПОЧВЫ ПРИ МЕХАНИЗИРОВАННОЙ ПОСАДКЕ РАССАДЫ ОВОЩЕЙ ПОД МУЛЬЧИ ПОЛИЭТИЛЕНОВОЙ ПЛЕНКИ

Аннотация. В статье рассмотрена потребность в использовании сопротивление почвы и использование нормировании операций по обработке почвы. Твердость почвы определяется специальном прибором – твердомером. Представлена диаграмма твердомера в состоянии проверки почвы.

Ключевые слова: Твердость почвы, твердомер, пенетрометр, измерение твердости, плотность.

Введение

Твердость - сопротивление почвы проникновению в нее тела (металлического плунжера) определенной формы. Этот прибор называется твердомером. Твердомер, как покажем далее, при определенных условиях может использоваться в нормировании операций по обработке почв. За рубежом (больше всего в США) рассчитывают аналогичный показатель, называемый коническим индексом [1].

Наиболее низкую твердость имеют верхние слои распахиваемых почв. Обычно в посевном слое (0-10 см) твердость редко превышает 5-10 кгс/см^2. В случае прохождения плунжера через слои с более крупной структурой или с более высокой плотностью показатели твердости несколько возрастают. Глубже в зависимости от времени спустя после последней глубокой обработки твердость сохраняет постоянные значения либо постепенно возрастает в переделах 10-20 кг/см^2. Наибольший подъем соответствует переходу от пахотного к подпахотному слоям, где размещается плужная подошва. Здесь твердость может возрасти до 30-40 кгс/см^2 и выше. Глубже твердость несколько снижается и далее остается постоянной. Чем ее содержание выше, тем выше и твердость. На такую особенность твердости обратил внимание П.В.Горохов (1990) [2].

Большое разнообразие почв при выполнении механизированных работ и значительная вариабельность их удельного сопротивления затрудняет получение таких данных, а вместе с этим и решение многих вопросов, где этот показатель крайне необходим. Это и конструирование почвообрабатывающих орудий, и обоснование оптимального режима их