

ние работа, адаптивно подстраивается под нужды и физиологические особенности коров; своевременное получение информации о состоянии коров, которую невозможно получить в обычной ситуации, позволяет управлять животными на основе индивидуального подхода и адекватно реагировать на проблемы с изменением их производительности и проявлять другие причины; увеличение дохода за счет повышения продуктивности коров; дополнительный доход от повышения качества и безопасности молока; лучшие условия содержания и более гуманное отношение к животным, которые будут влиять на их сохранение, снижение уровня заболеваний и более длительный срок хозяйственно-полезного использования.

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BASICS OF GRANULATING FEED AND EXCREMENTS

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Now in Ukraine there is a clear tendency towards the use of granulators or even whole lines of granulation of feed and waste of various origins [1-2]. For the production of high-quality granules, you need not only to have a workable technique, but also to know the basics of raw material granulation.

The specificity of granulation of combined feed is its composition, which consists of a crushed mixture of vegetable (grain crops, oilseeds, beans, grain waste, hay, straw,) and animal origin (meat meal, meat and bone meal). For the proportional growth and development of animals and birds, amino acids, vitamins and macronutrients are usually added to the feed [3] For each type of animal, you need to use a special recipe for compound feed that meets their needs.

When choosing equipment, you first need to decide for whom the granulated feed will be prepared. For the preparation of feed for poultry, granules with a diameter of 2–3 mm are suitable, for rabbits – 4 mm, for pigs and cattle – 6–8 mm [4].

For the granulation of compound feed, depending on the engine power, the following granulators are used:

- 4 kW, productivity 70–150 kg / h;
- 7,5 kW, productivity 200–300 kg / h;
- 11 kW, productivity 250–350 kg / h;
- 22 kW, productivity 600–1000 kg / h.

If such equipment is used as part of an automated feed granulation line, granulators with a capacity of 300–1000 kg / h are used [2].

As for the disposal of animal or bird excrement, granulation is one of the main ways to solve this problem [5–6]. The most popular are pellets from horse, cow (cattle) and chicken manure. For example, bird droppings cause a lot of harm to the producers themselves, service personnel and the territory in which it is stored. With a little effort, droppings will become one of the most valuable and effective soil fertilizers. Pelleting excrement will help to make a profit, and not spend money on its disposal, in order to ensure the environmental safety of the territory and water bodies.

Excrement granulators are most often made to order. All of their active parts are made of stainless steel or coated with acid-resistant metal, making them well suited for the granulation of any aggressive raw materials [7]. Such foreign manufacturers are engaged in the manufacture of equipment for excrement processing: Doza-Gran, Pol-service, Alkar, Linda Liu, Fuyi. To select the right granulator, it is necessary to select the engine power, the optimal matrix parameters and the raw material recipe. Granular fertilizers or pellets produced in this way are of high quality, and the components of raw materials do not lose their properties.

The most common way to use excrement is fertilization. Its effectiveness in increasing soil fertility has been tested for millennia. Granular excrement is a more convenient form of fertilizer that can be used with modern automated seed drills [6].

Benefits of granulated excrement as fertilizer:

- absence of harmful elements;
- the optimal ratio of useful and nutrients;

- do not contain pathogenic microflora, weed seeds, eggs and larvae of pathogens;
- have the ability to local machine application by serial agricultural machinery;
- ease of transportation and further use;
- do not cake, are not subject to self-heating and spontaneous combustion;
- long shelf life, practically do not lose their properties even after opening the package;
- non-toxic, absolute harmlessness, both for soil and for humans;
- environmentally friendly, do not have a strong unpleasant odor.

The second most popular method of disposal of excrement is incineration, but in its pure form, this raw material requires too much energy. Granular excrement is itself a source of energy, which is even used in the heating system of livestock farms [7]. After burning the pellets, ash remains with a high content of useful elements (potassium, calcium, phosphorus,). This ash can also be used to fertilize the soil.

Thus, when granulating excrement:

- prevent pollution of the territory and harm to the health of people and animals;
- save on disposal (for removal, placement and storage at platform);
- receive highly efficient fuel for their own needs;
- sell valuable fertilizer.

The main advantage of pellets from compound feed and excrement is many times lower costs for long-distance transportation. Granules retain all the useful properties of the original product, but can be stored for a very long time, because their only enemy is bacteria feeding on organic matter, which can live and multiply only in high humidity conditions.

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FEATURES OF BIOMASS GRANULATION

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In recent years, solid fuel based on renewable energy sources has become widespread in Ukraine and the world [1-2]. Biomass pellets are among the most popular according to demand. Today, according to international studies, about 7 % of the world's biomass is needed to replace fossil energy sources. Popular sources of biomass are sawdust, grain waste, straw and seed husks, sunflower waste, reeds [3].

Sawdust is formed as a result of wood processing. Sawmills and furniture factories regularly generate such waste. It is an excellent biofuel with high calorific value and low cost. Pellets obtained from sawdust can be used in home pyrolysis and even industrial boilers.

The basis for the pellets is coniferous or oak sawdust, only they contain a sufficient amount of lignin (natural glue). They can also be used neat. Species of other sawdust are granulated only if the recipe contains ≥ 60 % oak or pine needles. For granulation of roots, thin branches, hornbeam, ash, acacia, 10–20 % of soybean, rapeseed or sunflower waste is added to sawdust as a binder. If you need to process a lot of sawdust, it is better to choose an automated fuel pellet granulation line.

Cheap fuel is raw material from wood fiber board scraps (MDF, HDF, OSB). Compared to wood pellets, the ash content of this biomass is slightly higher. But on the other hand, the granulation of residues allows you to get rid of garbage at the enterprise and reduce the cost of heating the premises. Such materials already contain natural glue, so you do not need to add oak / pine sawdust to them. But special equipment is required. Hulls, weed seeds, particles of leaves and stems, damaged and too small grains that are formed during the primary processing of cereals (drying, cleaning and sorting) are grain waste.

Grain wastes of wheat, rye, oats and other food crops have a high nutritional value, therefore they are used for the production of pelleted feed. Grain waste of industrial crops (rapeseed, soybeans) has a high calorific value (19 MJ / kg or 4600 kcal / kg) and low ash content (8 %), they are used as a cheap fuel.