**УДК 631.171**

# REDUCED ENERGY RESOURCES IN PORK PRODUCTION

Uskenov R.B.[1], c.a.s.,
Boltianska N.I.[2], c.t.s.
[1]*Kazakh Agro Technical University S. Seifullina, Astana, Kazakhstan*
[2]*Dmytro Motornyi Tavria state agrotechnological university, Melitopol, Ukraine*

One of the largest consumers of energy in Ukraine is the agricultural sector. Therefore, from the point of view of the strategy of sustainable development and rational use of material and energy resources and energy efficiency of the agrarian sector of Ukraine, in particular the livestock industry, it is necessary to undertake the economic rationale of the strategy of Energogarant and develop modern scientific and normative framework for the design of energy efficient livestock facilities to carry out the modernization of existing buildings, to bring the Ukrainian agricultural market modern and innovative system of construction; technologies and materials; to determine the direction of the possible use of nonconventional renewable energy sources in the livestock industry [1-5].

The main reason for the high energy intensity of the domestic national income is low technological and technical level of economy, using ineffective energomechanic technologies, both in production and consumption of energy in industrial and agricultural enterprises. While the extent of use of achievements of scientific and technological progress in Ukraine is far behind the use of similar technologies in the developed world. So put the task of searching for new technological approaches that reduce the cost of electricity, fuels and other material resources for the production of livestock products [2, 10].

In the conditions of pig farms in the barns for keeping animals used is natural or forced ventilation. The principle of natural ventilation is that air is supplied into the room and removed a specially arranged channels due to the difference of pressures outside and inside the building. From the point of view of consumption of this ventilation is the most economical, but its efficiency depends on the temperature difference between inside and outside, which should be at least 8-10°C. At smaller temperature differences the air flow is dramatically reduced and even stopped. Therefore, natural ventilation is ineffective at high external air temperatures in the transitional and summer seasons.

In modern economic conditions, there has been a sharp reduction in the range of equipment manufactured. At the same time, the manufactured equipment, in terms of nomenclature and quality parameters, does not meet the requirements for creating an optimal microclimate, especially for

automation of regulation, economical use of energy resources and environmental protection.

The use of this or that type of heating of the pig farm depends on the sex and age of the pigs, as well as on the configuration of the room. To a large extent, the choice of a heating system is associated with the presence of certain energy resources on the farm. In modern pig breeding, the most economical devices are direct combustion of fuel in the room (gas, liquid fuel). These are blower heat generators. However, due to technological features, they can only be successfully used in rooms for keeping pregnant sows, boars and fattening pigs. They create intense air movement, which is unacceptable in the premises of queen cells and growing. In the remaining rooms, water heating registers such as a delta tube, a ribbed pipe for general heating and water mats (or floor sections) for heating the den of piglets, to which water is supplied from the boiler, have proven themselves best.

Analysis heat loss from the premises for pigs showed that the capacity of the equipment to maintain the required microclimate and energy consumption depend on the air temperature outside and inside the premises, the degree of thermal protection of buildings, ventilation and other factors. Therefore, the main directions of energy saving is the reduction of energy consumption for ventilation and heating of the supply air and the rationalization of space-planning decisions.There are a number of ways to reduce energy consumption in the production of pork on farms and complexes (Fig. 1). The existing energy-saving microclimate systems today are based mainly on the reduction of heat loss with ventilation emissions and through building envelopes, as well as on the use of alternative energy.

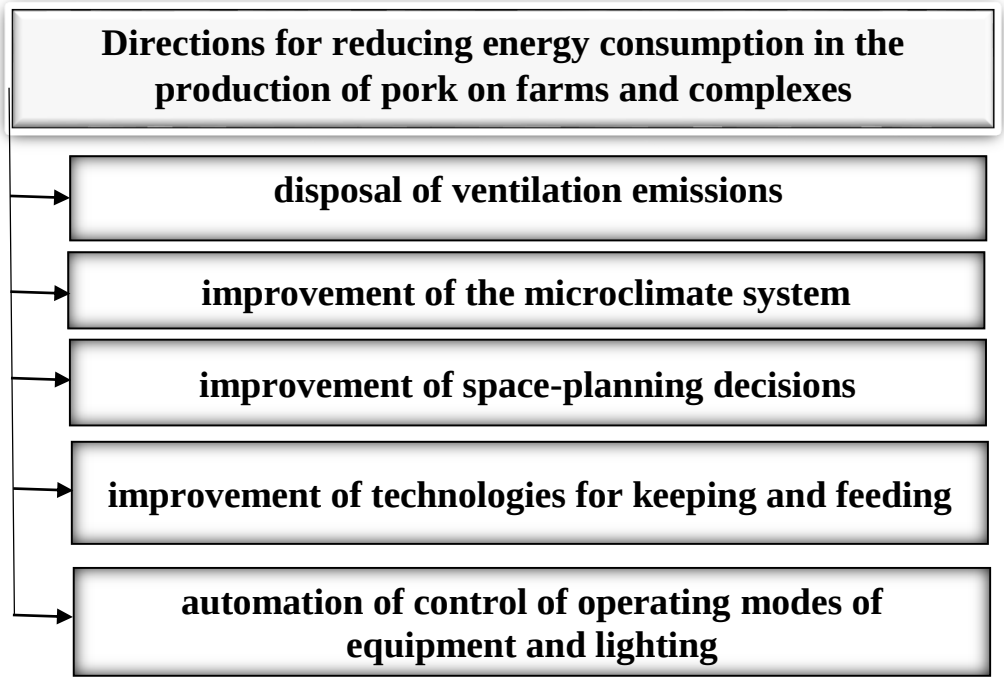


**Fig. 1. Directions for reducing energy consumption in the production of pork on farms and complexes**

The most effective technical solution to the problem of reducing energy consumption for ventilation is the recovery of the heat of the air that is removed from the room. Today, more than 70% of the heat is removed with ventilation air.

The work carried out to create heat exchangers of various types (regenerative, recuperative, based on heat pumps, heat pipes) led to the conclusion that heat exchangers with an intermediate heat carrier are most suitable for pig farming, since they could be equipped with water heaters, fans, pumps and fittings. The main components of this type of heat exchanger were air cooling and heating heaters, an intermediate coolant circulation pump, exhaust and supply fans, and recirculation and bypass ducts with air valves. The removed, passing through the heating coil, is cooled, heating the intermediate coolant, and is exhausted into the atmosphere by the exhaust fan, and the cold outside air passing through the cooling coil is heated and is supplied to the room by the supply fan.

At pig farms in Ukraine, the microclimate system using foreign equipment is being reconstructed. This allows you to significantly save energy. These ventilation systems can reduce energy consumption by 30-50%. “SKOV” is a Danish manufacturing company, which occupies a leading position in the global market for regulating the microclimate and controlling the operational parameters of pig farms and poultry farms and recommends a ventilation system without the use of air blowers for reconstructed enterprises (Fig. 2).

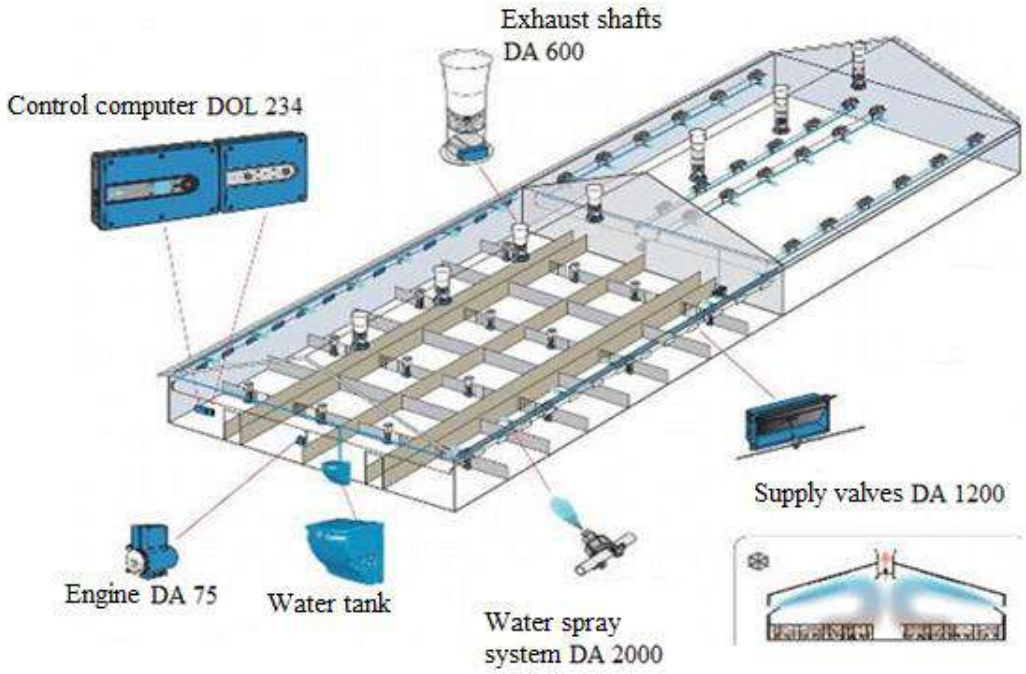


**Fig. 2. Automatic climate control system "SKOV"**

Air enters the room through the supply system. The nodal moment of the system is the trapezoidal overlap of the plates for the supply air. The

plates are made of fiberglass, therefore they are not subject to corrosion. The ceiling includes two layers of fiberglass and is fastened with screw connections. Air is removed from the room through an exhaust fireplace CL-600, the high performance of which is combined with low energy consumption. It provides for the possibility of emergency ventilation using an air stream due to uneven heating of the surface. The main components of SKOV automatic climate control systems are: exhaust shafts with fans; supply valves or devices for forced air flow; motor drives and connecting elements; climate control computers.

A distinctive feature of the microclimate systems offered by foreign companies is a different principle for the formation of the indoor air environment. While ventilation systems were widely used at Russian pig farms and complexes, exhaust ventilation systems are mainly used abroad, with which low pressure is created in the room and fresh outside air is supplied from outside through various designs: ducts, valves, and supply shaft or perforated ceiling. Equal pressure systems are also gaining ground, but their disadvantage is the high cost.

***References***

1. Boltyanskaya N.I. The system of factors of effective application resurser-Gauci technologies in dairy cattle in the enterprise. *Scientific Bulletin Tauride state agrotechnological University. Electronic scientific specialized edition.* Melitopol. 2016. Vol. 6. 55-64.

2. Boltyanska N. Ways to Improve Structures Gear Pelleting Presses. *TEKA. An International Quarterly Journal on Motorization, Vehicle Operation, Energy Efficiency and Mechanical Engineering.* Lublin-Rzeszow, 2018. Vol. 18. No 2. P. 23-29.

3. Boltyanskaya N.I. Indicators of an estimation of efficiency of application of resourcesbutGauci technologies in animal husbandry. *Bulletin of Sumy national agrarian University. A series of "Mechanization and automation of production processes".* Amount. 2016. Vol. 10/3 (31). 118-121.

4. Boltyanskaya N.I. The dependence of the competitiveness of the pig industry from it-chnology parameters of productivity of the animals. *Bulletin of Kharkov national University-University of agriculture after Petro Vasilenko*. Kharkov. 2017. Vol. 18. 81-89.

5. Boltyanskaya N.I. The development of the pig industry and the competitiveness of its products. *MOTROL: Motoryzacja i Energetyka Rolnictwa*, 2012. Vol. 14. No3b. 164-175.

6. Boltyanskaya N.I. The creation of optimal microclimate parameters in the conditions of growing shortage of energy in the pig industry. *Scientific Herald of National University of Life and Environmental Science of Ukraine. Series: Technique and energy of APK*. Kiev. 2016. Vol. 254. 284-296.