

A pilot sample of a three-pipe recuperator is designed for a pig farm for 50 heads of a pig farm.

Technical characteristic of a three-pipe recuperator for a pig-breeder of 50 heads

Name of item	Element parameters
Three-pipe module	material – $\text{ст3кп} - \text{ПК} - \text{МТ} - \text{УР} - 1/2 \text{ ГОСТ } 14918 - 80$ total length – 9,5 m; diameter of the outer pipe – 0,53 m; diameter of the middle tube – 0,36 m; diameter of the inner tube – 0,18 m; pipe wall thickness – 0,0005 m.
Corner modules	material – $\text{ст3кп} - \text{ПК} - \text{МТ} - \text{УР} - 1/2 \text{ ГОСТ } 14918 - 80$ corner – 90°; pipe diameter – 0,53 m; pipe wall thickness – 0,0005 m.
Fan with controller of performance	model – OVK 4E 350; performance range – 0-2500 m³/h; overall dimensions (ØD×ØD₁×ØD₂×L) – 388×442×460×200; rated power – 0,5 kW.
Electric heater	model – PET-1,5; temperature range – 0...+40 °C; overall dimensions (L×W×H) – 648×246×174; thermal power – 1,5 kW.

UNIQUENESS OF THE RECUPERATOR

- 1. The amount of supply air prevails over the amount of exhaust air to prevent the formation of reverse draft.
- 2. At the same time, inflow and air extraction are provided.
- 3. Problem and installation speed.
- 4. Convenient control system with the help of a rheostat switch.
- 5. Energy saving.
- 6. Availability and ease of maintenance of the system.
- 7. Guaranteed quality.
- 8. A fair and affordable price for a competitive price-quality ratio.

MARKETS



Large and medium-sized livestock farms



Housing and communal utilities

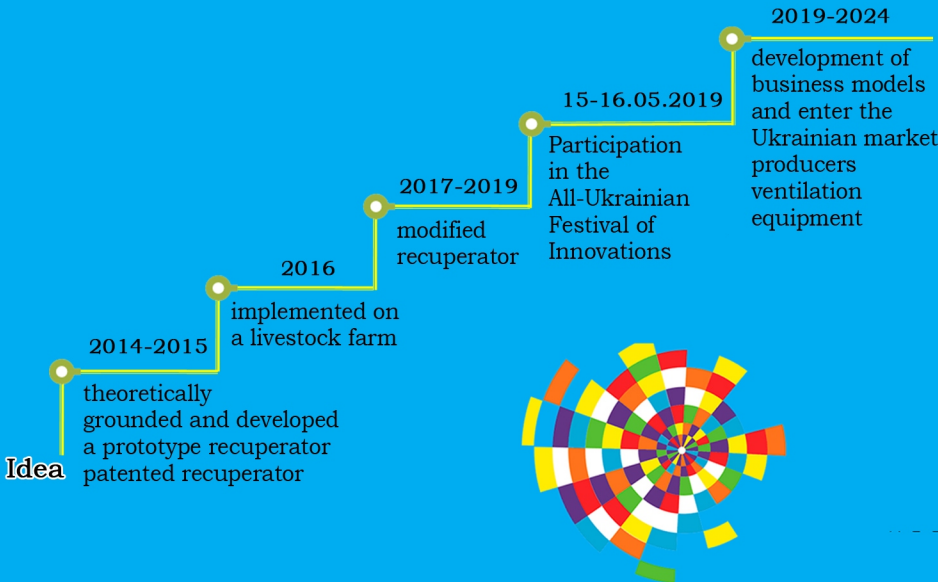


Logistics companies

COMPETITORS

Criteria	Prana	Prolisok	ARK	Recuperator
Unit price, UAH / m³	41	37	34	26
Simple construction	-	-	-	+
Field of use	Housing and communal utilities	Housing and communal utilities	Housing and communal utilities	Agro-industrial complex Housing utilities Logistics companies
Recovery efficiency	75-80%	64-68%	67-72%	87-91%
Distribution of the air flows in a premise	point	point	point	evenly

GO TO MARKET ROADMAP



Vinnytsia National Agrarian University

RECUPERATOR



FRESH AIR - REASONABLE SAVINGS!

Ukraine, Vinnytsia, str. Sonyachna 3,  
tel. +38 (0432) 55-60-95, 55-60-96  
e-mail: vnaunauka2021@gmail.com



## OUR TEAM



**VITALII YAROPUD**  
PH. D OF ENGINEERING, ASSOS.  
PROF., PROJECT MANAGER



**SERGIY BURLAKA**  
PH.D IN ENGINEERING,  
CO-FOUNDER



**MYKHAILO KARPIUCHUK**  
PHD STUD. IN ENGINEERING,  
PROMOTER



**DIANA BOHATYRCHUK**  
MCS STUD. OF ECONOMICS,  
MARKETER



**KATERYNA CHMYKH**  
MCS STUD. ELECTRICAL  
ENGINEERING, RESEARCHER

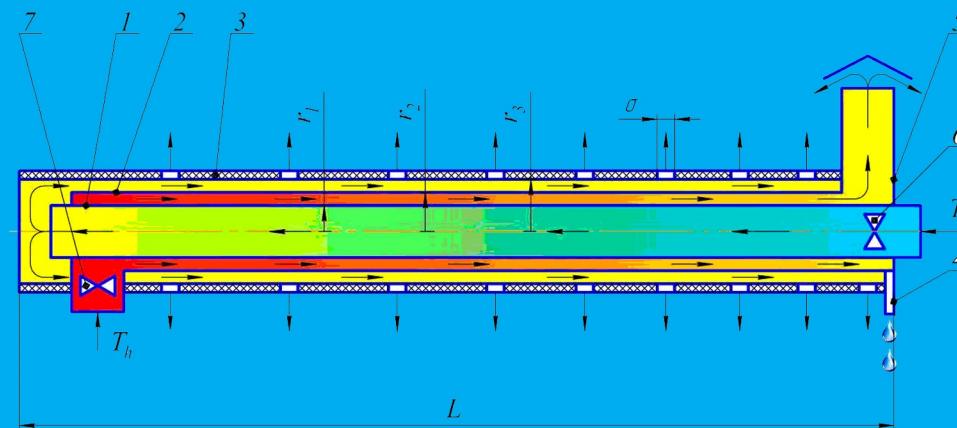
## Development of the energy-efficient equipment for maintaining the standard parameters of the microclimate in premises

This project is an integral constituent of solving an urgent problem connected with the development and implementation of the equipment for maintaining normative parameters of the microclimate in livestock buildings.

Using the recuperator will provide the regulatory parameters of the microclimate and prevent the above negative effects.

## TECHNOLOGICAL PROCESS THREE-PIPE RECUPERATOR

The technological scheme of the three-pipe recuperator includes pipes 1, 2 and 3, which are installed coaxially, a condensate drain tube 4 that passes through the pipe 3 and is located in the lower part of the pipe 2, the exhaust manifold 5 passing through the pipe 3, the inflow 6 and the exhaust 7 fans.



Technological scheme of three-pipe recuperator  
with the basic parameters:

$r_1$ ,  $r_2$ ,  $r_3$  - the radii of the inner, middle and outer pipes, mm;  $L$  - length of the outer tube, mm;  $\sigma$  is the area holes, m<sup>2</sup>;  $T_h$  - temperature of exhaust (warm) air, °C;  $T_c$  - temperature of the inflow (cold) air, °C; 1, 2, 3 - pipes; 4 - condensate drainage tube; 5 - Exhaust mine; 6 - inflow fan; 7 - Exhaust fan.

The recuperator processes the process in the following way. The inflow (cold) air by the fan 6 is fed through the inner pipe 1. By the fan 7, the exhaust (warm) air from the room is forced into the space between the pipes 1 and 2, which has a circular cross-section. The exhaust air enters the external environment from the exhaust manifold 5, and the inflow air opens and continues to move in the opposite direction in the space between the pipes 2 and 3, which also has a circular cross-section. Thus, there is a process of heat exchange between the inflow and exhaust air through the walls of pipes 1 and 2, so that the inflow air is heated to a certain magnitude.

When cooling the exhaust air on the outer surface of the pipe 1 and the inner surface of the pipe 2, a condensate is formed to dislodge the tube 4. To exclude the air cooling in the room, the surface of the outer pipe 3 is insulated.

## PROBLEMS

Technological indexes disparity in of the microclimate impacts leads to:

- a reduction of milk yield by 10-20%;
- a decrease in live weight – by 20-33%;
- an increase in the number of young animals – up to 5-40%;
- a decrease in the weight of chickens – by 30-35%;
- additional forage costs;
- shortening the age of machines, equipment and building;
- reduction of the animals' resistance to diseases;
- abundant costs of energy carries for heating the premises.

