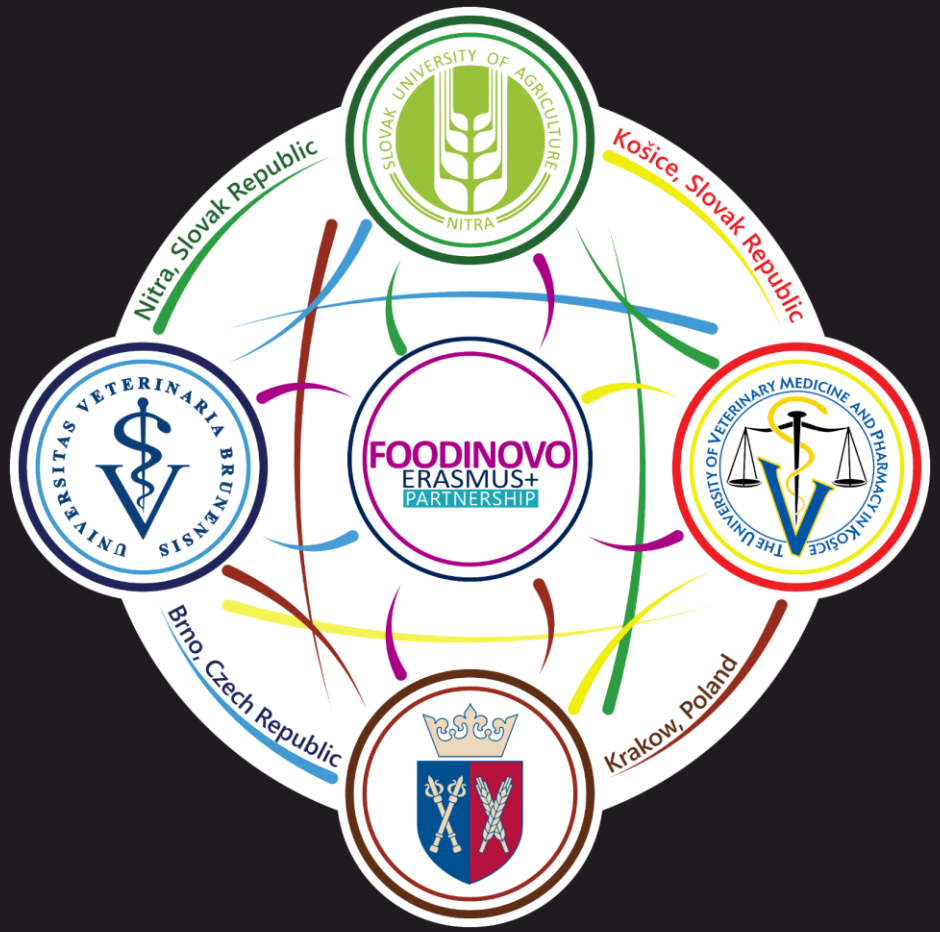
Innovations in poultry slaughter processing

Fig. 1



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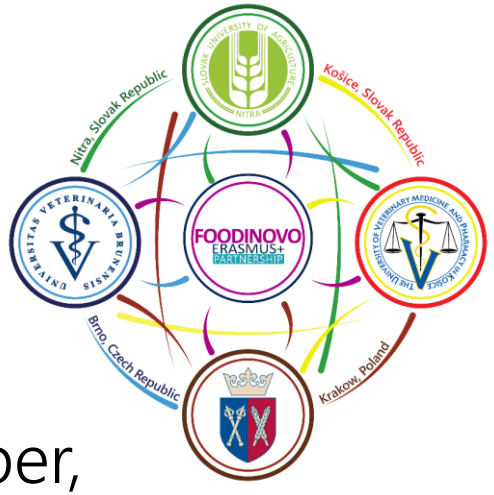
Low atmospheric pressure stunning



- it is a form stunning of poultry
- It offer significant welfare improvements of poultry than the stunning with gas/electrical stunning
- birds in their transport containers are placed in a sealed chamber,
- the atmospheric pressure is gradually reduced using controlled slow decompression with a vacuum pump.
- This results in the gradual removal of O_2 in the air thereby causing unconsciousness and death by hypoxia (lack of O_2)
- birds display similar behaviours to that observed during gas stunning,
- including non-aversive gas such as N or Ar gas
- European Food Safety Authority concluded that method is acceptable for commercial slaughter of meat chickens weighing less than 4 kg

Low atmospheric pressure stunning

- Benefits - for bird welfare include:
- Consistency – all birds are exposed to the same pressure at the same time and the pressure does not need to be adjusted according to number, size or density of birds.
- gas stunning and electric stunning methods do not provide consistent and uniform stunning.
- No live bird handling and shackling of birds – in electrical stunning systems, shackling of live birds prior to stunning causes stress and injuries in birds.
- No aversive gases – the use of high concentrations of CO_2 gas has been shown to be aversive and cause distress in birds.
- Reduced stress – the birds are able to be placed into this system in their transport containers in darkness which helps keep birds calm.

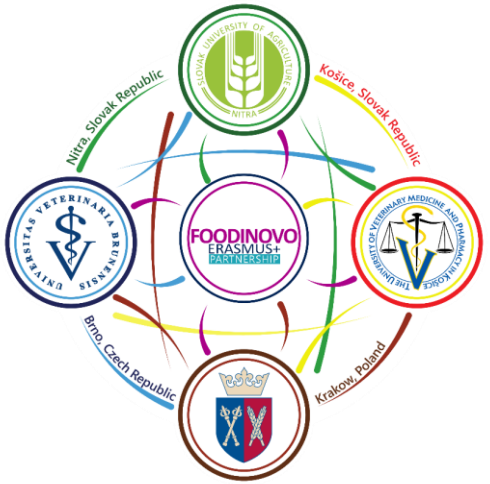
Transcranial magnetic stimulation of the brain

- TMS for stunning of poultry :
- is a non-invasive method to apply electromagnetic induction,
- create an intense magnetic field,
- TMS probe containing Cu coil to place close to the skull of the bird,
- electric current charged by a generator induces
- the magnetic stimulus within the brain cortex surface.
- The method may have the potential for a future development
- into a short-lasting, reversible stunning method.

Using microwaves of stunning of poultry

- use of frequencies microwaves between 300 MHz and 300 GHz
- which lead to increase of temperature of the brain.
- the aim is to achieve a brain temperature at which
- hyper thermic syncope (between 43 °C and 50°C.)
- Advantage:
- controlled irradiation can induce a reversible stun,
- when the energy is applied in such a manner
- that the bird is rendered unconscious, without tissue damage.

Equipment with high-speed cameras



- This equipment may enable:

- the detection of anomalies in the carcass, or
- the classification of breast fillets on the production line
- without contact, and product damage.

- Muscle stiffness is measured when
- the fillets move and fall off a conveyor.

Automated poultry grading system

- is able to evaluate the whole carcass or its individual parts
- automated in line „ weight and vision based“ quality grading
- system gathers data on anatomic parts for quality assessment
- and allows the product to be graded at the highest processing.
- Accurate assessment of all anatomic parts is the basis
- for the optimal distribution to the cut – up lines.
- Digital grading system of computer technology:
- eliminates manual grading.
- It brings the right product to the right line fully automatically
- according to the pre – set specifications – it automatically
- distributes the graded birds to suitable cut – up modules.

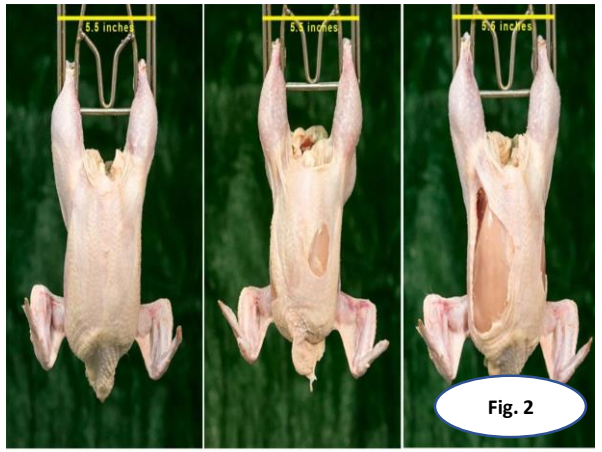
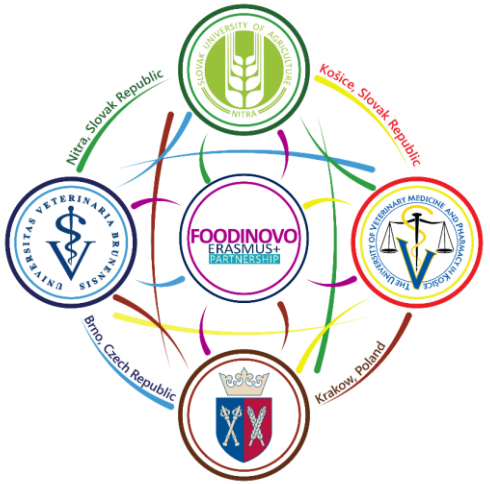


Fig. 2

Batching

- The batch release unit - for the weight grading line.
- used at plants where is required to reach a target weight
- at each drop off station, then is blocked automatically till the collecting
- bin has been emptied and the release button has been operated.
- The control of the batching release - computer system of the grading line.
- Effective batching is an important step in plant logistics.
- It saves labour and time.
- The selection of the right individual products to form a batch
- is done by various systems and levels of automation
- using different batching algorithms:
- minimum weight, count and fixed weight.

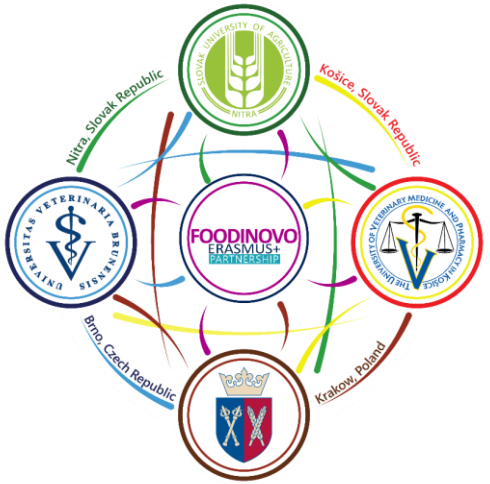
3D virtual system for automatic deboning



- the use of 3D imaging and a robotic cutting arm
- to automatically perform precision cuts for poultry deboning

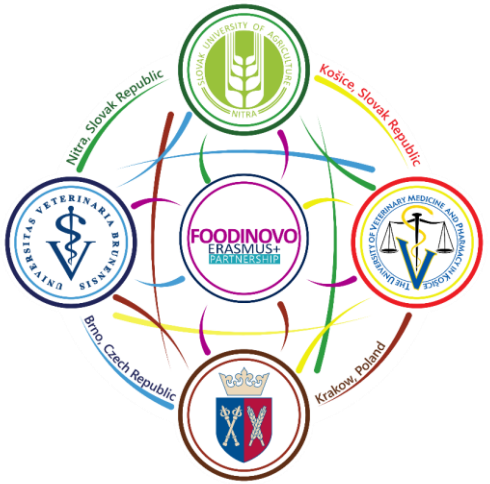
- that optimize yield
- while eliminating the risk of bone fragments
- in finished poultry products.

Innovation in poultry slaughter processing



- The Georgia Tech Research Institute developed a
- simulation model for the use of
- water, energy, effluents for the slaughter and poultry processing plant.
- Based on the VENSIM Software is possible
- to simulate all the processes that involve
- the use of water, being a tool for decision making
- with predictive resources and also includes modules
- for related processes such as using of water, energy and wastewater

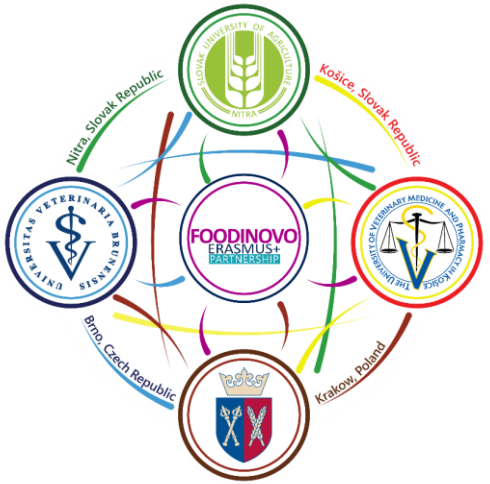
Robotic systems



- Novel 3D vision-guided robotic concept
- for front half chicken harvesting and a
- computer vision algorithm

- locate the grasping point in 3D as
- the initial contact point of the gripper
- with the chicken carcass
- for harvesting operation

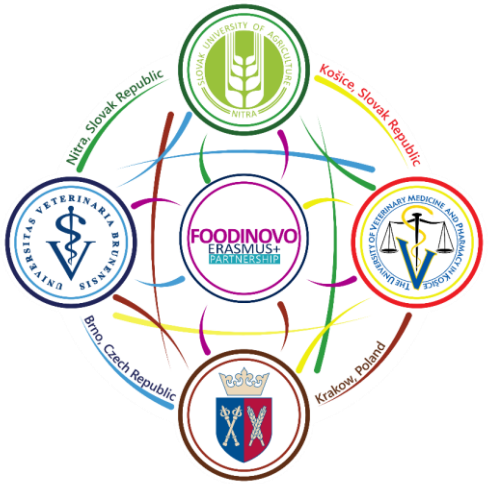
Robotic systems



- Deboning robot
- for removing bones of the poultry carcass before slicing

- An intelligent robotic cutting system.
- It consisted of the 6-axis robotic arm for
- fixing chicken carcasses and
- 2-axis cutting robotic arm for adjusting
- the position of the tool for precise cutting.

Automatic evisceration technology



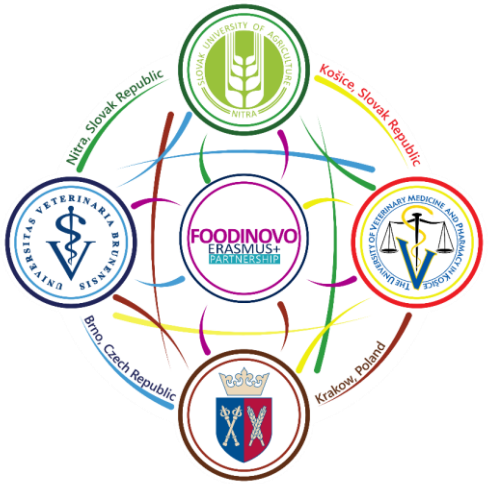
Advantages:

- lower labour intensity,
- higher production efficiency,
- market competitiveness and
- greater working environment

Robot eviscerating system

- consist of chicken carcass conveying device, robotic manipulator,
- control system and machine vision system.
- Method to determine the position of poultry visceral organs.
- with machine vision technology.
- The identification rates of this visceral contour recognition 95.3%
- the high degree automatic poultry eviscerated robot system
- slaughtering and processing technology equipment
- improve work efficiency
- the machine vision system - to use at robotic evisceration of chicken.

Types of intelligent packing of meat products



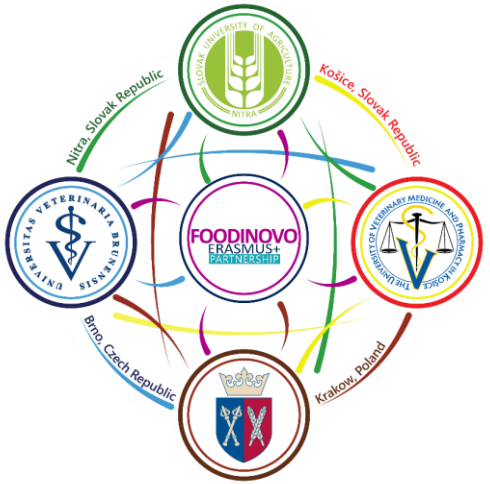
- They are systems that :

- monitor the condition of packaged foods
- to give information about the their quality during transport and storage

used in:

- vacuum packed poultry meat and
- in modified atmosphere packed meat

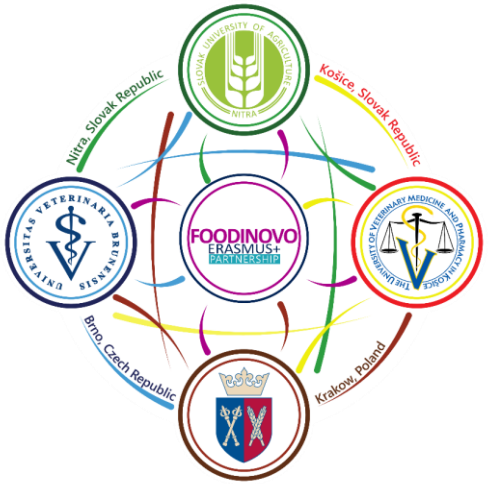
Time–temperature indicators of the package



- through whole distribution chain
- provide indirect information
- on the actual quality status of the food.

- They have the ability to show a continuous change
- in which the rate depends on the increase of temperature and
- which is not reversed when temperature

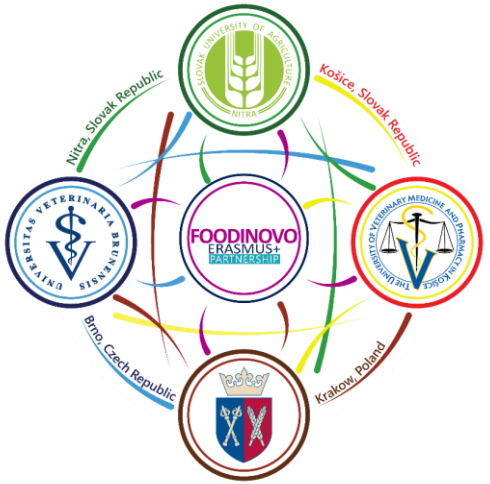
Time – temperature indicators of the package



- Advantages of indicators:

- decreases resistance to mechanical abuse,
- non-toxicity,
- small size,
- low cost
- unaffected by other environmental conditions
- such as light, humidity

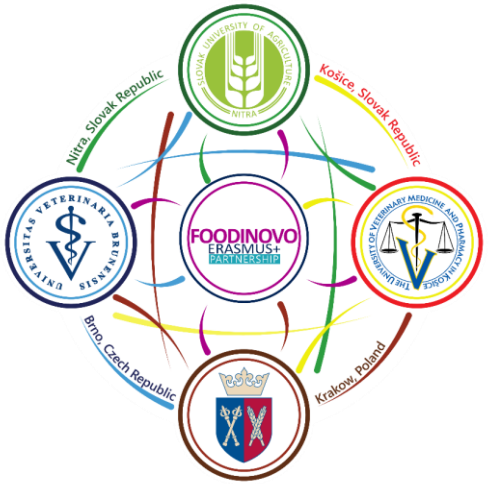
Freshness Indicators



- Sensors:
- reveal information about the products' quality
- by evaluating their reaction to:

- the metabolites produced during the growth of microorganism(s) or
- during chemical changes within the food

Leakage Indicators



- A reduction in the initial concentration of CO_2
- could be a sign of leakage in a package

- As a result to leaks:
- the protective atmosphere is lost causing deterioration
- of the food product.
- increase the microbial spoilage,
- product contamination with harmful microorganisms

Conclusion

- Significant progress in the poultry meat industry
- is possible due the advancements in:

- animal and meat sciences,
- animal nutrition,
- animal welfare,
- special engineering,
- computer sciences and
- automation in meat processing facilities

Fig. 4

One of the most important driving forces of progress in society are innovations

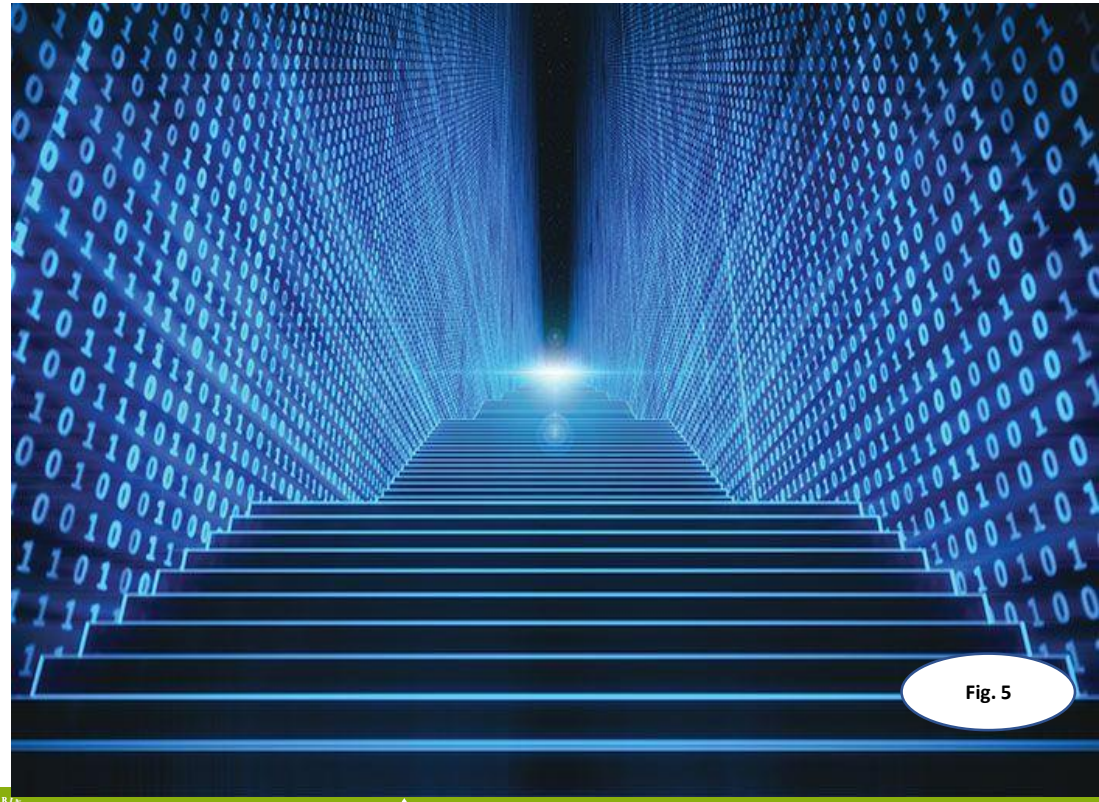


Fig. 5

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