

Meinung der Verbraucher über den Einfluss des Wohlergehens der Tiere bei der Schlachtkörperverarbeitung auf die Fleischqualität

Zusammenfassung

In den letzten Jahren interessieren sich die Verbraucher immer mehr für die Art und die Verfahrensweisen bei der Nahrungsherstellung. Sie wollen wissen, woher das Fleisch, das sie kaufen, herkommt und wählen demgemäß, was sie kaufen. Die Verbraucher interessieren sich dafür, ob mit den Tieren im Sinne ihres Wohlergehens während der Zucht, des Transportes und der schlachtlichen Verarbeitung umgegangen wurde. Sie verlangen, dass dabei immer mehr humane Methoden verwendet werden. Die Umfrage wurde in der Zeitspanne vom Oktober bis Dezember 2011 auf 187 zufällig ausgewählten Kandidaten durchgeführt. Die Kandidaten waren vom Gebiet der Sisacko-moslavačka županija, Županija grada Zagreba und Zagrebačka županija. Darunter befanden sich 45,5 % männliche und 54,5 % weibliche Kandidaten. Ähnlich wie in bisherigen Untersuchungen in Kroatien, betonte die meiste Zahl der Kandidaten ihre Fürsorge für das Wohlergehen der Tiere. Trotz ihrer Fürsorge, führen sie keine Rechnung darüber, wenn sie Fleisch kaufen. Die meisten Musterproben und Musterproben-Verfahren in dieser Untersuchung ermöglichen Beschlussfassungen über die kroatischen Fleischverbraucher und deren Standpunkte bezüglich des Wohlergehens der Tiere. Trotzdem ist es nötig, solche Untersuchungen auf einer größeren Zahl der Prüflinge aus allen Regionen Kroatiens durchzuführen.

Schlüsselwörter: Wohlergehen der Tiere, Fleischqualität, Verbraucher, Umfrage

Opinione dei consumatori dell'influenza di benessere di animali durante la lavorazione in macelleria sulla qualità della carne

Sommario

Negli ultimi anni i consumatori sono più interessati del modo e procedimenti di lavorazione e produzione di alimentari: vogliono sapere da dove proviene la carne che comprano, e secondo l'informazione ottenuta scelgono ciò che comprano. I consumatori ora vogliono sapere se gli animali sono stati trattati bene durante il loro allevamento, il trasporto e la lavorazione in macelleria, e chiedono ogni giorno di più che si usino i metodi umani in tutto il procedimento. La ricerca sociale fatta nella forma di questionario, nel periodo dall'ottobre al dicembre del 2011 sul campione di 187 intervistati a vicenda nella Contea della città di Sisak e regione di Moslavina e nella zona della Contea della città di Zagabria ed i suoi dintorni (ambidue situate nella Croazia centrale). La ricerca ha incluso il 45,5% dei maschi e il 54,5% delle femmine intervistate. Simile alle ricerche eseguite finora in Croazia, ma anche conforme all'opinione che prevale nei paesi dell'Unione europea, una notevole maggioranza degli intervistati in questa ricerca sottolinea il loro grande interesse per il benessere degli animali. Ma, ciò nonostante, la loro maggior parte non ci pensa mentre compra la carne. La grandezza del campione ed il procedimento di campionaggio in questa ricerca ci portano alla conclusione legata ai consumatori croati e ai loro atteggiamenti e opinioni che riguardano il benessere degli animali, ma è necessario ripetere queste ricerche su un campione e sulla distribuzione ancora più grandi in tutte le regioni della Repubblica di Croazia.

Parole chiave: benessere di animali, qualità di carne, consumatori, questionario **Parole chiave:** ferro, tossicocinetica, alimenti

Sample size and sampling procedure in this research enable making some conclusions on Croatian meat consumers and their attitudes on animal welfare, but these researches should certainly be repeated on larger sample and distribution of examinees from all regions of the Republic of Croatia.

* This paper is an excerpt from the diploma thesis by Davorin Mijatović "Consumers' opinion on the influence of animal welfare at processing to meat quality" (mentor: Lidija Kozačinski, PhD, full professor)

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Procedure with slaughterhouse by - products after poultry processing

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professional paper

Summary

Along with carcasses and confiscated waste, by-products of animal origin appearing in livestock production on farms or in slaughterhouse facilities, plants for processing and production of food of animal origin, during transport, in ZOOs, hunting grounds, etc., are a serious hygienic – epidemiological problem, as well as ultimately an ecological one. Due to a potential danger for the environment and human and animal health, a great attention is paid to disposing and harmless removing of by – products of animal origin within a wider community. At the same time it is a part of the activities carried out by the Veterinary Public Health. On the other hand, rendering plants are facilities for hygienic processing by decomposing animals which are dangerous or potentially dangerous for human health. In rendering plants' technological process, procedures of heating, separation and filtration are used in order to destroy bacteria successfully, extract protein, remove moisture and separate protein from technical fat. The first real beginning of rendering industry is considered to be the moment when fat obtained by melting by – products of animal origin was started to be used in everyday life. Except for the ecological meaning, facilities for processing slaughterhouse by - products also have a large economical meaning which is reflected in the income approach of obtaining highly valuable protein supplements for production needs, i.e. for the preparation of highly valuable protein supplements for the needs of production, i.e. preparation of fodder. Our current legislation is in accordance with the EU legislation, but unfortunately, it will take some more time until its full application.

Key words: slaughterhouse by – products, rendering plant

Introduction

Along with carcasses and confiscated waste, by-products of animal origin appearing in livestock production on farms or in slaughterhouse facilities, plants for processing and production of food of animal origin, during transport, in ZOOs, hunting grounds, etc., are a serious hygienic – epidemiological problem, as well as ultimately an ecological one which is tried to be solved within the activities carried out by the Veterinary Public Health (Njari, 2001, Njari et al., 2001). Due to a potential danger for the environment and human and animal health, a great attention is paid to disposing and harmless removing of by – products of animal origin within a wider community (Majurdžić and Njari, 2004a and b). Numerous laws and regulations regulate this issue, e.g. the Veterinary Medicine

Act (Anon., 1997, 2007), the Environmental Protection Act (Anon., 2007), the Waste Act (Anon., 2004) and the Regulation on animal by – products not intended for human consumption (Anon., 2006).

Procedure with by – products of slaughterhouse processed poultry

A slaughterhouse poultry processing has its own hygienic – technological sequence which makes a processing whole (Diagram 1). During that processing we come across a whole array of inedible by – products which are taken care of by the Veterinary Public Health. Handling of animal by – products in the Republic of Croatia is regulated by the Veterinary Act (Anon., 1997 and 2007) and the Regulation on handling of animal carcass-

es and by – products of animal origin and their destruction (Anon., 2003). Handling of by – products of animal origin by the veterinary – sanitary principles and principles of veterinary environment protection implies accepting, collecting, categorizing according to the risk degree, temporary storing of by – products in collection centers with cooling devices, autopsy of dead animals (diagnosing causes of death) and thermal processing. According to the Regulation on handling animal by – products not intended for human consumption (Anon., 2009), the Regulation 1774/2002 was completely transferred to Croatian legislation and animal by – products were divided to three categories (K1, K2, K3).

The material of the first category (K1) includes by – products of animal

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origin or any other products which contain such by - products, and they are:

- all parts of the carcass including skin of the animals suspected to be infected by transmissible spongiform encephalopathies (TSE) or where the TSE presence has already been officially confirmed, the animals killed in conducting measures of eradicating TSE, the animals which were not farmed animals and wild animals, especially including pets, the animals from ZOOs and circuses, the animals used in experiments for scientific purposes and when it is suspected that they are infected by diseases which can be transmitted to people or animals;
- specified risk material and whole animal carcasses or parts of animal carcasses which specified risk material hasn't been removed from;
- products obtained from the animals which were given substances forbidden by special regulations and products of animal origin which contain the remains of pollutants from the environment and other harmful substances, if they exceed allowable limit;
- all the remains of by - products of animal origin collected during the wastewater treatment in processing facilities K1 and other facilities where specified risk material is removed, including by - products obtained by sieving, removing the sand, mixture of fat and oil, silt and the remains of by - products removed from the drain, i.e. settling tanks of the drain in facilities, except in the cases when such material doesn't contain specified risk material;
- catering waste from transportation means in international transport;
- mixed material of the first category (K1) with the material of the second category (K2) or with the material of the third category

Table 1 The number of livestock in the Republic of Croatia¹ in 000

Species	2009	2010	2011
Poultry	10 787	9 470	9 523
Cattle	447	444	446
Sheep	619	630	639
Pigs	1 250	1 231	1 233

¹Source: CBS

Table 2 The number of animals considering the growth in the Republic of Croatia¹ in tons

Growth	2009	2010	2011*
Cattle	87	82	98
Pigs	197	178	172
Sheep	11	13	11
Poultry	122	113	105

¹Source: CBS

Table 3 Share of by - products of animal origin in average body weight of an animal (Asaj, 1974) in %

Animal	Bones	Blood	Sequestration of lungs, liver, emergency slaughter	Skin, hair, hooves	Content of gastrointestinal tract	Tissues for pharmaceutical industry
Cattle	7.1	2.5	2.7	10.7	17.7	0.03
Pigs	2.4	2.5	2.3	0.3	10	0.15
Sheep	2.2	3.3	1.6	1.7	15.5	0.15
Poultry	9.2	2	1.5	11	0	0

- (K3) or both, including all the categories of the material intended for processing in some facility for processing material K1;
 - the products of animal origin which are no longer suitable for human nutrition for any reason, can be transported mixed with the material K1 and K2 during their dispatch to incineration.
- The material of the second category (K2) includes:
- farmyard manure and the content of gastrointestinal tract,
 - all remains of the by - products collected during wastewater treatment from slaughterhouse facilities, including the remains of the byproducts obtained by sieving, removing the sand, mixture of fat and oil, silt and the remains of by - products removed from the drain, i.e. settling tanks of the drain in facilities,
 - products of animal origin which contain the remains of veterinary drugs and contaminants, if they exceed the allowable limit prescribed by a special regulation,
 - products of animal origin, except for the materials of category 1, which are imported and when it was determined during a health inspection that they didn't meet the veterinary requirements for their import, unless they are returned to the supplier,
 - carcasses and parts of carcasses, except for those which died or were slaughtered, but not intended for human consumption, including the animals killed for the purpose of eradication of infectious diseases,
 - mixed material K2 with the material K3, including all the material intended for processing in the facility for processing K2,
 - other by - products of animal origin, except for material K1 or K3.

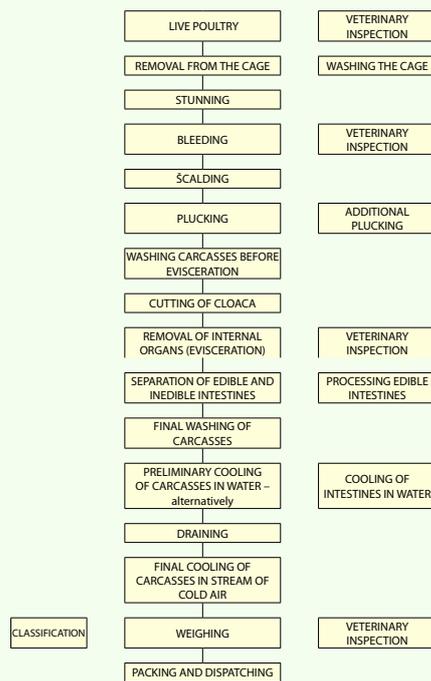


Diagram 1: Stages of poultry processing in a slaughterhouse (Njari, 2010)

- diseases that are transmittable to people or animals and which originate from the carcasses safe for human nutrition,
- skins, hooves and horns, pig bristles and feathers from the animals processed in a slaughterhouse facility and which were checked ante mortem and declared safe for slaughterhouse processing based on that examination,
- blood of the animals processed in

- a slaughterhouse facility, except of ruminants, after post mortem examination which determined that they are suitable for slaughterhouse processing and human nutrition,
- by - products of animal origin which originate from the production of products intended for human nutrition, including degreased bones and cracklings,
- foodstuffs of animal origin or foodstuffs containing products of animal origin, except for catering waste which, due to commercial reasons, manufacturing defects, packaging defects or other defects, don't represent any threat for people or animals, are no longer intended for human nutrition,
- raw milk obtained from animals which do not show clinical signs of any disease that can be transmitted by that product to people or animals,
- fish and other sea animals, except for the marine mammals, caught in open water for human nutrition or the production of fish flour,
- fresh by - products of fish from the facilities for fish processing,
- egg shells, by - products of hatching chicks and by - products of broken eggs, obtained from the animals which showed no clinical signs of any disease which can be transmitted to people or animals over such products,
- blood, skins, hooves, feathers, wool, horns, hair and fur of animals which showed no clinical signs of any disease which can be transmitted to people or animals over such products.

By the development of intensive livestock production based on industrial food for animals, there appeared great needs for protein feed. That actualized the possibility of processing animal by - products to meat and bone meal in the past. Based on annual reports of the Croatian Bureau for Statistics (CBS), the number



Diagram 2 : Production process in Agroproteinka d. d. rendering plant

of livestock and its growth changes from year to year (Tables 1 and 2). Of course, it depends on many factors. But, regardless of that fact, the quantity of the collected material in the form of by-products of slaughterhouse processing, inedible parts and condemned meat is quite large. To count the quantity of that material considering the kind of tissue, we can use an earlier calculation (Table 3).

Processing by - products in a rendering plant

Rendering plants are facilities for a hygienic removal of animals dangerous or potentially dangerous for human health. When it comes to the term rendering plant, people usually think about plants for processing by-products of animal origin (by-products at slaughter line, diseased dead animals, etc.), waste fats and oils. During the rendering plant's process there is applied the method

of heating, separation and filtration in order to destroy the bacteria successfully, to extract the protein, remove the moisture and separate the protein from technical fat. The beginning of rendering plants is recorded in Jordan, whereas the usage of fat obtained by melting by-products of animal origin and its usage in everyday life is considered to be the beginning of rendering industry (Burnham, 1996). Processing in a rendering plant must be strictly conducted. Maintaining hygiene in strictly separated "unclean" and "clean" parts of the facility (Photo 1) is especially important. So Strauch (1995) lists that unclean part of the rendering plant consists of the entrance (the so-called "ramp") and the area for receiving raw materials, car wash, sanitary premises for the staff, storage for skins and the area for necropsy. The clean part of the rendering plant consists of: plants, boiler rooms, storage of finished prod-

ucts, common room, silo for keeping flour and fat. The technological process within the rendering plant is divided into receiving raw material, processing raw material, maceration, sterilization and drying, after which there follows degreasing and pressing, chopping degreased mash and storing of products (Diagram 2). A technological solution planned that a special vehicle for receiving raw material goes through a disinfection barrier by its wheels during the entrance into the yard of the rendering plant, then goes to the scales followed by the reception area for raw materials, where it is unloaded to tanks designed for it, and then the vehicle is cleaned (washed) by a steam stream. After that the vehicle proceeds to the scales and a disinfecting station. A vehicle prepared in such a way is ready for departure to receive new raw material. Raw material from a receiving area is brought to a grinder by a screw conveyor, where it is chopped and directed by a screw conveyor to a transport line with a permanent magnet and a detector for separation of metal. After metal parts are separated, the mass is carried by a screw conveyor to the horizontal reversible screw conveyor, which is then used to carry it continuously into steam boilers ("destructors") made according to the principle of dispenser weighing. When the destructor is filled, mass supply is automatically turned off and the filling of the other "cannon" starts. After the filling, destructors are closed by pneumatic fasteners, vent valve is closed and steam valve is opened. Steam is brought to the mixer and destructor duplicator through it, so sterilization and destruction or tissue destruction begin. Filling of the destructor is controlled by automated weighing. Chopped product in the destructor is heated so that the temperature in its center is higher than 133°C for at least 20 minutes continuously and at absolute pressure of at least 3 bar. Measuring and filling of the destructor, sterilization process



Photo 1: Agroproteinka d. d.

and the work of the entire line are controlled by a computer system. Through the steam drain valve unpleasant smells are drained to the capacitor and further to the system for the purification of waste air, i.e. biofilter. After sterilization of by-products of animal origin in destructors has been performed, the "batch" technological cycle is finished. The supply of process steam is closed for destructor duplicator and the valve is opened. Due to overpressure in the destructor and energy in meat mash, the destructor is emptied through pipeline into intermediate tanks. After the emptying of the destructor through the breather valve, the destructor is vented, the valve for emptying is closed and batch process in the destructor is repeated. Vapors produced in the process are drained to the capacitor where they are cooled and the condensate cooled in such a way goes to the device for purifying waste waters. Further course of the process is performed continuously. Drying starts by opening the steam drain. At that stage the temperature is maintained for 20 minutes at 70°C - 80°C so that the water from the meat mash can evaporate. The drying process itself is performed in vacuum until the maximum moisture content of 4% is achieved. The meat mash from the destructor is discharged to plate kilns which are filled with 80 l dispensers by closing and opening inflatable

slides. Dehydration of meat mash is achieved by releasing technological fat into the rotor of the dryer. Free fat flows through beaded floor to screw conveyor for fat which is used to transfer it to the collection tank and then it is pumped to the device for fat processing. Ducts and screw conveyors are heated in the process. Pressed meat mash is drained to the elevator which transports meat and bone meal (MBM) to cooling. That is done in order to achieve better transmissive (transport) characteristics, so MBM is directed over the outlet opening with flat latch with manual blocking to the screw conveyor which transports it then to the next distribution screw conveyor. That distribution transporter is equipped with two outlets and plate latches with manual blocking over which four silos are filled as needed. Meat mash from silos is drained to the tank of the mill which is made without a sieve and it is suitable for grinding a relatively fatty material. After grinding, the mass is directed to the device for "loosening" and then to the sieve by the screw conveyor, where it is sieved. The remaining material in the sieve is brought back by the screw conveyor to the mill for regrinding. The material grinded and sieved in such way is meat and bone meal, i.e. the protein of animal origin. The obtained meat and bone meal is brought by the screw conveyor to the

device which transports the mass to storage silos. MBM from the silos is drained by a screw conveyor to the homogenization device as needed, and then to the machine which fills the bags. Filled bags are taken directly to transport trucks and the technological process of rendering plant production of meat and bone meal is finished by it. The fat appearing in the process of rendering plant processing is transported to the tank where it is sterilized and sedimented. After the precipitate is separated, it is heated, mixed and drained to a decanter which separates the sludge from fat. The sludge is taken back into the process and the cleaned fat to the reservoirs for storage and dispatching. Within technological stages there are critical control points (CCP) as constituents in quality control (QC) and the principles of HACCP (GMP) and Good Manufacturing Practice (GMP), which are applied in the facility.

Instead of the conclusion, we should keep in mind that except for the ecological significance rendering plants have a significant economic significance too, which is also reflected in the economic approach in order to get highly valuable protein supplements for production needs, i.e. preparation of fodder. Therefore, animal by-products represent a specific animal waste matter, so because of that, we should perceive them from hygienic, epidemiologic, ecological and economical aspect. They should always be looked upon as potentially dangerous substrate due to microorganisms some of which are causative agents of zoonoses. The disposal of that material is an important part of veterinary activity through veterinary public health. The existent legislations are in accordance, even with the legislation of the EU, but unfortunately some time will pass until their complete application.

** The paper is an excerpt from the diploma thesis by Majhen, M. (2011): Procedure with

Verfahrensweisen mit schlachtlichen Nebenprodukten nach der Geflügelverarbeitung

Zusammenfassung
Nebenprodukte animaler Herkunft, die während der Viehzucht auf der Farm entstehen, oder in Schlachtobjekten, Verarbeitungs- und Herstellungsbetrieben der Nahrung animaler Herkunft, während des Transportes, in den Zoologischen Gärten, in den Jagdgebieten u.ä. zusammen mit den Kadavern und Konfiskat vorkommen, stellen ein ernstes hygienisch-epidemiologisches und in der Endphase ökologisches Problem dar. Große Aufmerksamkeit wird innerhalb der breiteren Gesellschaft der Entsorgung und dem ungefährlichen Abtransport von Nebenprodukten gewidmet, dies wegen der potentiellen Gefahr für die Umwelt, für die menschliche Gesundheit und Gesundheit der Tiere. Das ist gleichzeitig ein Teil der Tätigkeiten, welche das veterinärische öffentliche Gesundheitswesen in seiner Angelegenheit hat. Andererseits sind die Kaffillieren Objekte für die hygienische Verarbeitung solcher Produkte, durch das Zerstören der Tiere, welche gefährlich oder potentiell gefährlich für die menschliche Gesundheit sind. In den technischen Kaffillierprozessen werden Verfahren wie Erwärmen, Separation und Filtration verwendet, um erfolgreich Bakterien zu bekämpfen, um Protein zu extrahieren, um Feuchtigkeit zu entfernen und um Protein von technischen Fetten zu separieren. Der erste wahre Anfang der kaffillierischen Industrie ist der Augenblick, als im Alltag Fette erhalten durch das Schmelzen von Nebenprodukten animaler Herkunft, benutzt wurden. Objekte für die Verarbeitung der schlachtlichen Nebenprodukte haben außer der ökologischen auch eine wirtschaftliche Bedeutung. Das widerspiegelt sich auch im Einkommensansatz des Erhaltens von hochwertigen Eiweißzusätzen für die Herstellungszwecke, bzw. für die Vorbereitung des Viehfutters. Unsere gültigen Verordnungen sind im Einklang mit den EU Verordnungen, jedoch wird für ihre volle Anwendung leider noch eine Zeit vergehen müssen.

Schlüsselwörter: schlachtliche Nebenprodukte, Kaffilliere

Procedimento con i sottoprodotti di macellazione dopo la produzione di pollame

Sommario
I sottoprodotti di origine animale ottenuti durante l'allevamento di bestiame o negli stabili di macellazione, nei settori per lavorazione e produzione degli alimenti di origine animale, durante il trasporto, negli zoo, nelle aree di caccia ecc., insieme con i cadaveri di animali e tutti gli altri residui rappresentano un problema igienico-epidemiologico, e alla fin fine anche un problema ecologico. Alla conservazione ed eliminazione di sottoprodotti di origine animale oggi si presta molta attenzione nell'ambito della comunità sociale a causa del pericolo per l'ambiente, salute umana e degli animali. Con questo si occupa la direzione di salute pubblica veterinaria. Dall'altra parte, le caffilliere (in tedesco Kaffillieren) sono gli oggetti per la lavorazione igienica tramite la decomposizione di animali pericolosi oppure potenzialmente pericolosi per la salute umana. Nel processo tecnologico di caffilliere vengono applicati i procedimenti di riscaldamento, separazione e filtrazione, per distruggere con successo i batteri, per estrarre la proteina e per eliminare l'umidità dal grasso tecnico. Un inizio vero di quest'industria si considera il momento in cui si è cominciato a usare nella vita quotidiana il grasso ottenuto dai sottoprodotti di origine animale. Gli stabili per la produzione di sottoprodotti di macellazione hanno un valore sia ecologico che economico, che si riflette anche nel approccio alla produzione di additivi a base di proteine di alta qualità, cioè nella preparazione di misti addetti all'alimentazione di bestiame. Le nostre leggi - che per il momento sono in vigore - sono conformi alle norme di Unione europea, ma purtroppo ci vorrà un altro po' di tempo per darli la vita piena.

Parole chiave: sottoprodotti di macellazione, caffilliera

slaughterhouse by - products during and after slaughterhouse processing. Veterinary faculty Zagreb, manuscript, page 48 (Mentor: Bela Njari, PhD, full professor and Željka Cvrtila Fleck, PhD, associate professor).

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