

ENTEROTOXEMIA (OVER EATING DISEASE) OF SMALL RUMINANTS (SHEEP AND GOATS)

Bahar-E-Mustafa

UAF Sub Campus Toba Tek Singh

Enterotoxemia is preventable toxico-infectious disease in small ruminants. This disease is of acute and fatal nature in goats and sheep.

ETIOLOGY: Enterotoxemia is caused by the *Clostridium perfringens* type D. The bacterium normally lives in small intestine in relatively smaller number. However, under certain circumstances, it undergoes rapid proliferation and then it produces clinical onset of the disease through the production of a myriad of the cytolytic toxins. The various factors that lead to an abrupt increase in the population of this bacterium in intestine include an increased uptake of the protein and carbohydrates through various diets such as milk, milk replacers and/or green lush grasses. When an increased amount of the nutrients reach in the small intestine, then there is a rapid increase in this bacterial numbers. At this stage, bacteria extensively produce the significantly higher amounts of the variety of the toxins that are sufficient to cause the clinical onset of the disease. The deaths occur more frequently in newborn lambs/kids, or animals not vaccinated or whose dams are not vaccinated during pregnancy.

SIGNS: Following are the clinical signs of the enterotoxemia.

- i) Animal become lethargic and off feed.
- ii) Signs of stomach pain e.g kicking abdomen, panting, lying down and up frequently, lying on one side, and frequent crying.
- iii) Diarrhea sometimes mixed with the blood.
- iv) Animal cannot stand and lay down on ground on one side, they extend their legs and their neck and head becomes extended and turns back towards their back. This posture is caused by the toxin produced by the bacteria which affects the brain of the animals.
- v) The onset of the disease is so rapid that death occurs in most of the animals even without showing any clinical signs of the disease.

Treatment: Treatment is not successful in most of the cases, because the severity of the disease does not allow the animal sufficient time to survive. However, it may be treated with the use of broad spectrum antibiotics, use of specific antitoxins, supportive therapy and also oxygen therapy. However, the prognosis in most of the cases is guarded.

PREVENTION: Prevention of the Enterotoxemia is much successful than treating the disease. Followings are the some strategies and guidelines for the farmers to control the enterotoxemia in sheep and goats.

i) Vaccination: Vaccination is one of the most important tool to control any toxico-infectious disease. *Clostridium perfringens* type D vaccine is available. Minimum of two shots of vaccination are needed at least 10-12 days apart. Typically, first dose of vaccination is given around 6-10 weeks of the age and then booster is given about 2 weeks later. Then afterwards, annual booster is recommended in order to maintain a higher immunity against the disease. Similarly, ewes are also needed to be vaccinated 1-2 month prior to the lambing in order to gain the higher antibodies levels against the disease in their colostrum.

ii) Feeding Strategies: Various smart feeding strategies are also needed to be employed in order to get an appropriate control of the disease.

- a) The first strategy to be adopted is to feed animals 3-4 times per day in smaller amounts of feed rather than offering him feed once a day in large amount. Since, the clinical disease occurs when animal ingests suddenly a higher amount of the carbohydrates and protein; when animal gets a free access to the feeds that are high in energy and protein such as grains, lush green pasteur, haylage, silage and milk replacer, so care must be taken to provide the various diets in smaller amounts for 3-4 times per day.
- b) Practically, it is always better to feed the animal with diets low in the nutrient level such as hay and then feeding him on highly nutritious diet such as grains.
- c) There should be a gradual change in the feed. If there is a need to increase the feed allowance per animal, then try to make this change gradually, over a period of the several days or weeks rather increasing the feed suddenly. This will allow the intestinal microflora to become adapt to the changing diet and then no adverse consequences will be observed.

For those animals, which are being fed on hay or roughage and are needed to be grazed in grazing season, it is advised to graze them for about 10

minutes first day and the double this grazing time in each subsequent day. It will take approximately 2

weeks in order to keep them on pasture all over the day.

MEAT ADULTERATION: A SOCIAL PROBLEM AND ITS SOLUTION

Muhammad Issa Khan, Muneeb Khan, Amna Sahar

National Institute of Food Science & Technology, University of Agriculture, Faisalabad Pakistan

Adulteration in meat is a common issue in meat and meat products from economic, religious and health aspects. Incorporation of cheaper meat species in raw ground meat products has been expansively reported. Raw ground meat is widely used in preparation of many recipes and in the processing of sausages and hamburgers. The use of undeclared meat species in ground meat is adulterant in meat. Authentication methods can be categorized into the areas where fraud is most likely to occur: meat origin, meat substitution, meat processing treatment and non-meat ingredient addition. Within each area the possibilities for fraud can be subcategorized as follows: meat origin, sex, meat cuts, breed, feed intake, slaughter age, wild versus farmed meat, organic versus conventional meat, and geographic origin; meat substitution, meat species, fat, and protein; meat processing treatment irradiation, fresh versus thawed meat and meat preparation; non-meat ingredient addition additives and water.

Major issues related to meat in our modern society is the authenticity and traceability of meat. The consumer's choice for food products is mainly depends on the price and lifestyle which is also associated with the religion and health aspects of ingredients used. The interest of Muslim community towards the Halal certified meat consumption is increasing in international meat markets. The labelling of all ingredients in meat products is mandatory which quantifies animal species in products. Nowadays meat industry is facing problems related to adulteration of low value material in high quality meat. In this context, pork consumption along with other non-Halal animals are prohibited for religious concerns. In the past few years, identification of species specific proteins employed the electrophoretic and immunological methods, but there are limitations in using these methods e.g. proteins stability in raw meat and denaturation occurs during processing. Several other methods have been employed for the detection of fraud in meat products.

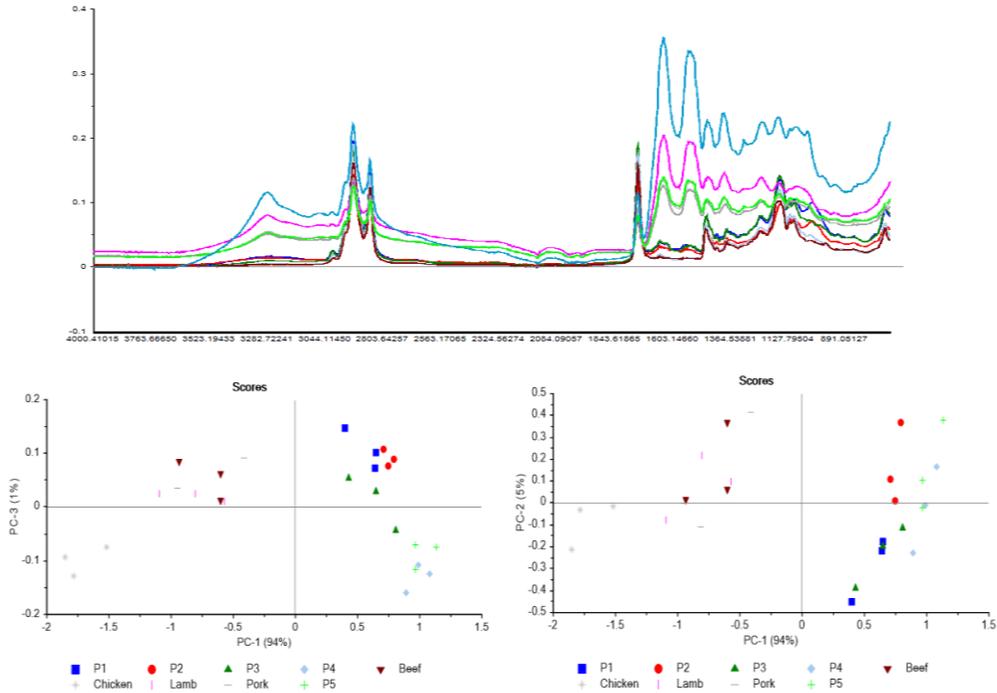
Traditional analytical and molecular methods are still in practice in food industries and food inspection laboratories. However, these methods are out dated and does not compete for fast paced processing and

production technologies because they are slow, laborious and require reagents. The only concern of consumers is towards meat adulteration, authenticity and associated health risks. For that reason, food laboratories need to be developed with simple, fast and non-destructive techniques which facilitate the real-time detection of adulteration, authenticity and associated frauds in meat. The detection of adulteration in meat and meat products is a dire need in a fast-growing community which encourage the development of rapid and non-destructive methods. Fourier transform infrared (FTIR) spectroscopy is a robust, ultra-fast, non-destructive and non-reagent technique used in rapid analysis of meat. It works with the principle of interference of infrared light when it interacts with the meat sample. It has potential to differentiate between beef, pork, lamb, chicken, turkey and fresh meat can also be identified. However, such good discrimination results will be more difficult to obtain if we want to authenticate foods containing mixes of several meat species. For that reason, NIR (near infrared) spectroscopy can be applied together with chemometrics in the classification of meat according to the type of meat.

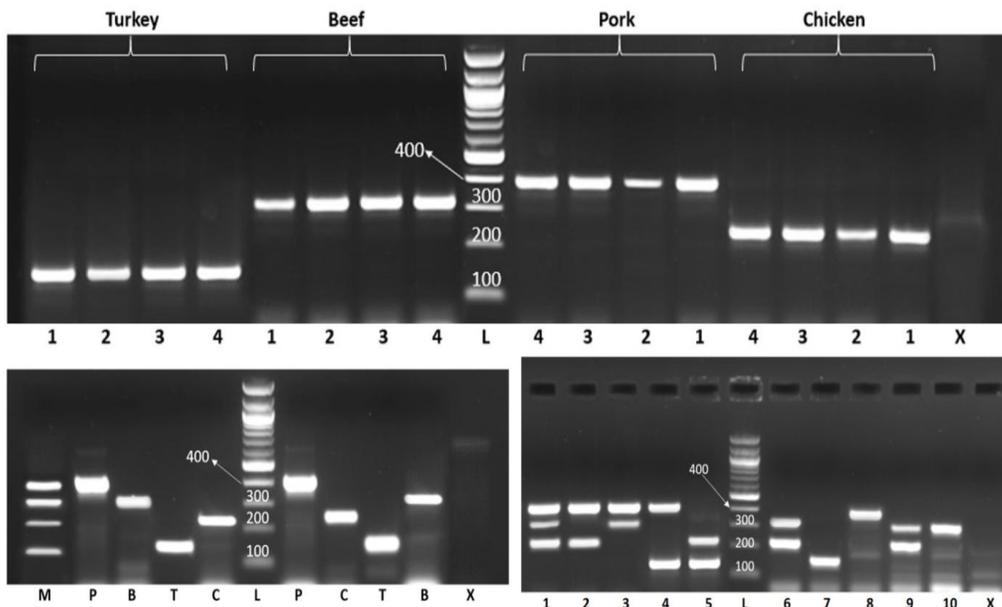
At present, PCR (polymerase chain reaction) is most suitable technique than protein for the detection of unintentional mislabeling and fraudulent of species. The DNA (Deoxyribose nucleic acid) is more stable and specific than proteins which make it reliable for molecular detection methods. To make the PCR more rapid and reliable the method can be modified at different steps to reduce the total run time of PCR. Cellulose material for DNA extraction and purification is commercially available and it has advantage over DNA purification through silica-based method. Cellulose material has four key benefits for the extraction and purification of nucleic acid. First, large amount of DNA and/or RNA is absorbed through its capillary action. Second, fast binding/entrapping of nucleic acid to cellulose fibers. Third, DNA and/or RNA retention to cellulose even after extensive washing. Lastly, adequate quantity of bound nucleic acids is

eluted in PCR mixture. This makes an ideal material for fast and simple purification of nucleic acids in as much short as 30 seconds. The developed molecular technique has proven to be efficient for simultaneously detection of animal species (chicken, beef, goat, turkey, pork, donkey and dog). In addition,

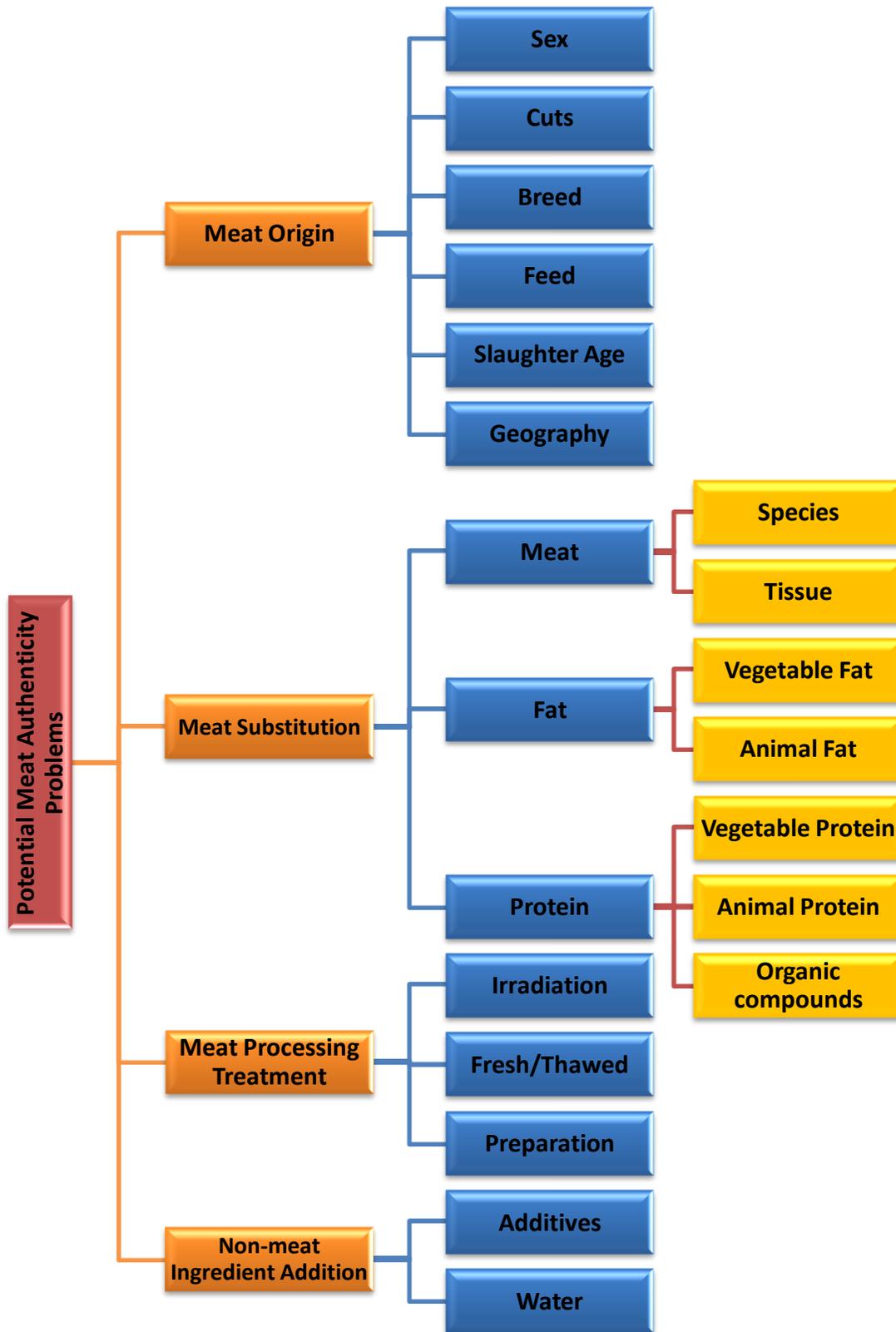
this assay has showed high specificity and excellent robustness with commercial meat products and it has potential to be implemented in food laboratories for the detection of fraud and adulteration worldwide, especially in developing countries.



FT-IR Results



PCR Results



Potential Meat Authenticity Problems