



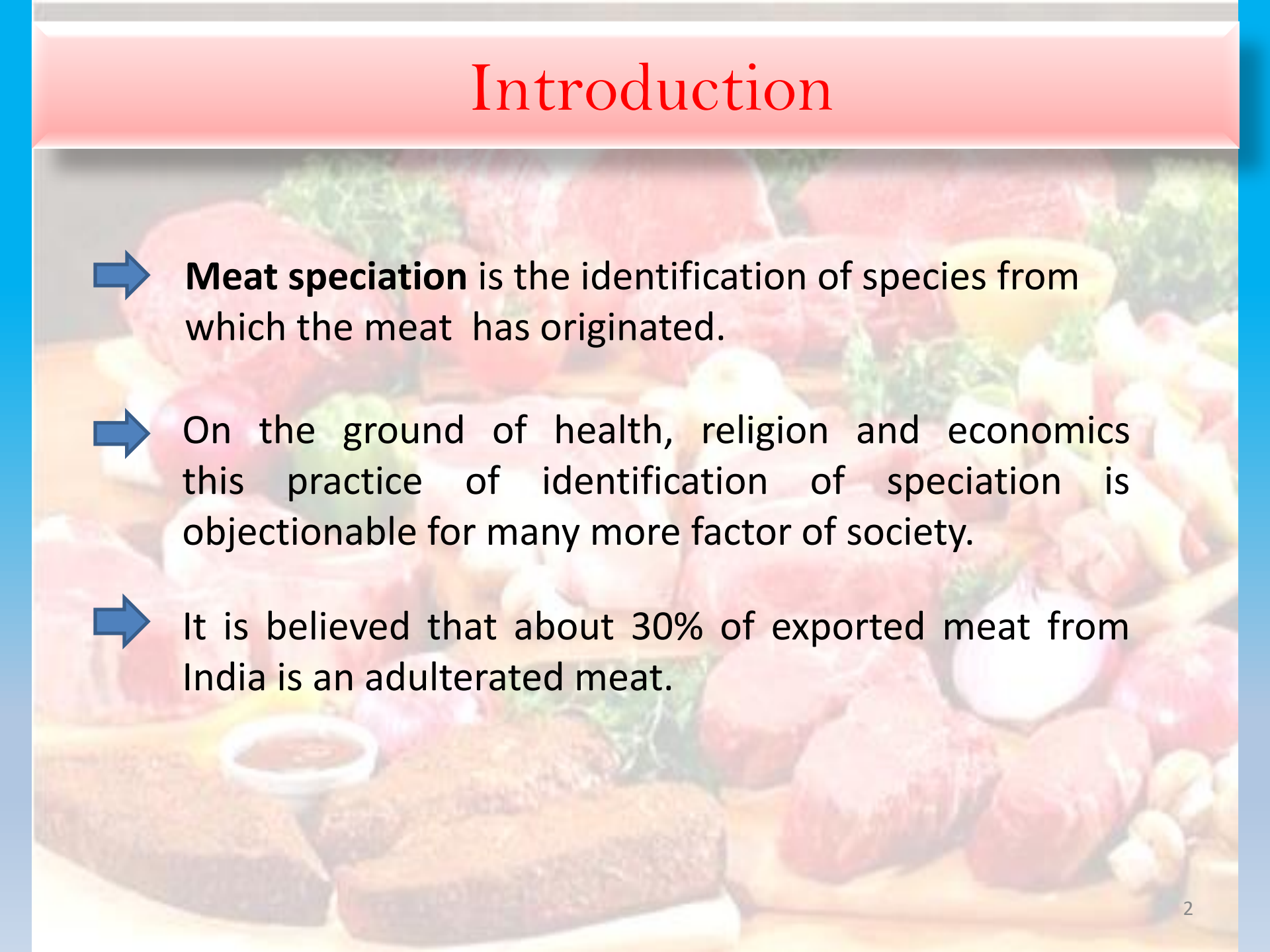
Livestock Products Technology

Meat Speciation

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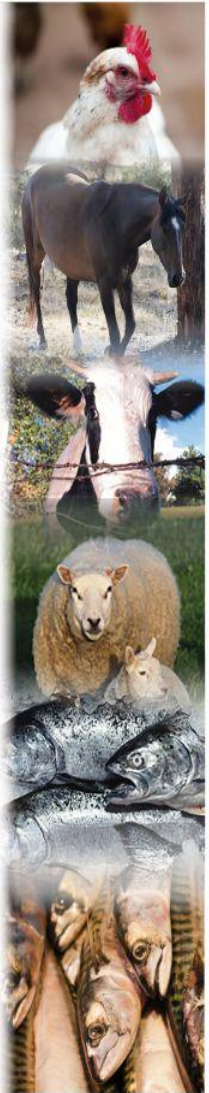
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Technology**

Introduction

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- ➔ **Meat speciation** is the identification of species from which the meat has originated.
 - ➔ On the ground of health, religion and economics this practice of identification of speciation is objectionable for many more factor of society.
 - ➔ It is believed that about 30% of exported meat from India is an adulterated meat.

Introduction

Conti.....



Meat species specification is an important as the quality control management in meat industry.

It is more challenging and revolutionary task for a veterinarian as we can ensure the quality of meat.

Different tests used in species identification are not only very much important and accurate but these are very accurate to identify the substitute which is added with its motto.

(Singh and Sachan, 2009).

Introduction

Conti.....

➔ The first case of fraudulent substitution was recorded in thirteenth century at **Florence in Italy** (Thornton, 1968).

➔ Other frauds:

Substitution of meat of another species

- Horse for beef especially in Britain and Ireland
- Beef in kangaroo meat in Australia
- Cat for chicken or rabbit
- Goat meat for mutton
- Dog meat and cat meat for chevon

(Kang'ehte et al., 1986)

Importance

- ➔ Helpful in implementation of different Acts which are for prevention of religiously important animals. It can restrict their slaughter.
- ➔ It is helpful to implement Wild Life Conservation Act, PFA acts of India and some other similar acts of the world.
- ➔ Fraudulent substitution can be identified as it is a malpractice in meat industry, it's a common practice in which inferior or cheaper quality meat is mixed into superior quality meat.



(Singh and Sachan,2010)

Methods of meat identification

1. Physical techniques
2. Anatomical techniques
3. Histological techniques
4. Chemical techniques
5. Biological techniques
6. PCR based techniques



1. Physical techniques

- ➔ In physical techniques we generally go for general appearance for detection of different meat species.
- ➔ It is a combined perception of **color**, **texture**, **odor** and **presence of other body parts along with meat**.
- ➔ It gives the primary idea about the meat species on the basis of quality characteristics of the meat.



(Gracey et al, 1999)

Quality characteristics of meat of different animals

Meat	Colour	Consistency	Odour	Marbling
Beef	Dark red with slight brownish tinge	Firm and cut surface shiny	–	Present
Buffalo meat	Dark red	Firm	–	Absent or poorly present
Veal	Pale grey to grayish red	Firm	–	Absent
Chevon	Light red	Very firm	Goaty odor	Absent or poorly present
Mutton	Dark red	Firm and dense	Ammonical	Present
Pork	Grayish pink	Very soft	Urine like	Present
Poultry meat	White	Firm	–	Absent
Rabbit meat	Pale grey to grey red	Firm	Pronounced	Absent

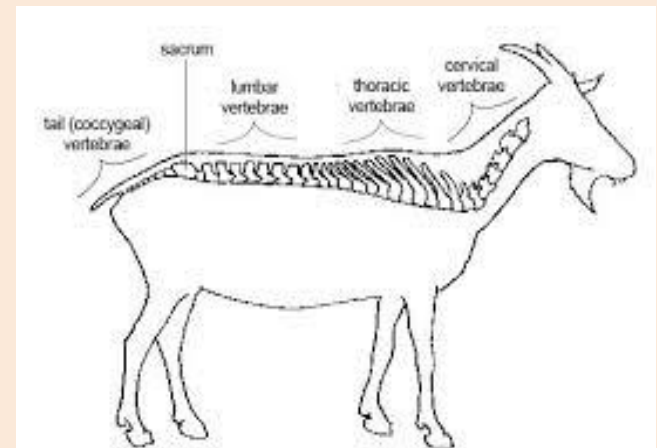
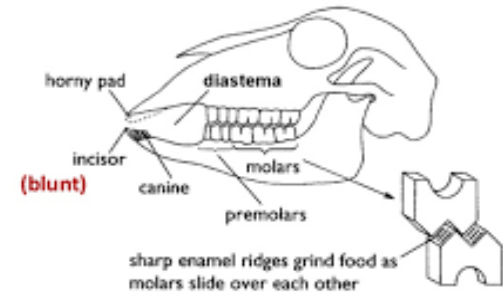
(Singh, 2008a, b, 2010; Sharma, 1999)

Differentiation of beef and buffalo meat on the basis of physical and chemical characteristics

Characteristics	Beef	Buffalo meat
Color	Dark red with slight brownish tinge	Dark red
Meat consistency	Firm and cut surface are shiny	Firm
Fat color	Yellowish white	Pure white
Marbling	Present	Absent or poorly present
Location of fat	Intramuscular	Mostly intermuscular
Fat consistency	Firm	Slightly firm
Carotene content	Present	Absent

2. Anatomical techniques

- Typical **dental** formulations.
- Identification on the basis of **vertebrae**.
- **Ribs** number present on the carcass.
- The anatomical structures must be present with meat at the time of inspection.



Anatomical Techniques

- On the basis of anatomical structure of different animal species, we can easily identify the meat species to which it is actually belongs.
- It is very difficult for meat species specification if meat is minced.
- The primary identification method for meat species is dental formula if teeth are attached with the carcass

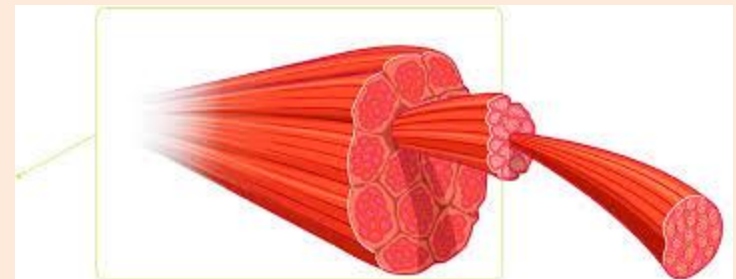
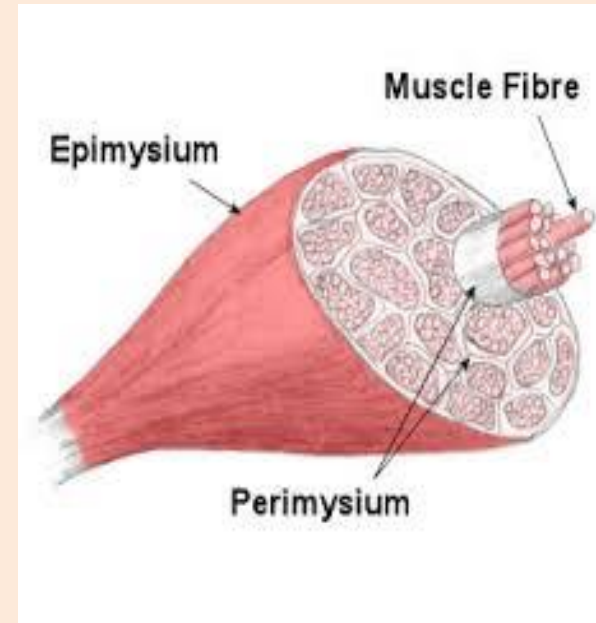
([Gracey et al., 1999](#); [Sharma, 1999](#); [Singh, 2008a, b](#); [Sachan and Singh, 2010](#)).

Dental formula identification of different meat animal species

Animal species	Dental formula	No. of teeth
Cattle and buffalo	$\begin{array}{c} (0033) \\ 2 \text{} \\ (4033) \end{array}$	32
Sheep and goat	$\begin{array}{c} (0033) \\ 2 \text{} \\ (4033) \end{array}$	32
Pig	$\begin{array}{c} (3143) \\ 2 \text{} \\ (3143) \end{array}$	44
Horse	$\begin{array}{c} (3133) \\ 2 \text{} \\ (3133) \end{array}$	40

3. Histological techniques:

- Muscle fiber length
- Muscle fiber diameter
- Muscle fiber density



Quality characteristics of fat of different animal species

Fat	Color	Consistency	Fat type	Bone marrow type
Beef	Yellowish white	Firm	Intramuscular fat	Pure white to reddish yellow
Buffalo fat	Pure white	Slightly firm	No Intramuscular fat	—
Veal	Reddish yellow to white	Loose and greasy	No Intramuscular fat	Pink red
Chevon	Pure white	Hard, firm	No Intramuscular fat	Firm and slightly red
Mutton	Pure white	Hard, firm	Abundant intramuscular fat	Firm and slightly red
Pork	White	Soft and greasy	Subcutaneous fat	Pink red and soft intramuscular also

5. Biological techniques:

- Also known as Serological or Immunological methods.
 - Precipitation test
 - Counter immuno electrophoresis (CIE)
 - Enzyme-linked immune sorbent assay (ELISA)
 - Complement fixation test(CFT)

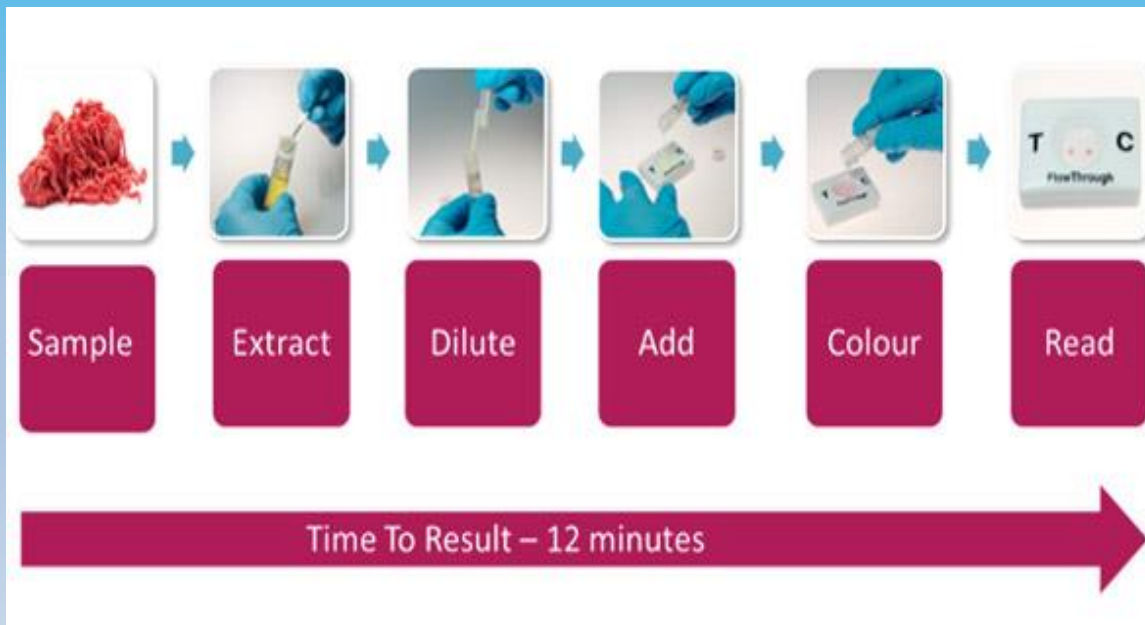
Enzyme-linked immunosorbent assay (ELISA)

- It is a rapid, highly sensitive and most suitable method for handling numerous samples at a time.
- By this technique we can detect up to 2% adulteration in the sample.
- There are several ELISA techniques in use depending on the compound fixed, solid support used and concentrations of antigen and antibodies used such as Indirect ELISA, Competitive ELISA and Sandwich ELISA.
- In Indirect ELISA, species is detected by the antisera that are subsequently used and labeled with suitable conjugate.

ELISA kit

A commercial ELISA Immunostick Screen Test is employed for identification of species composition of raw meat and poultry tissues.

It is currently marketed and distributed in the U.S. in a complete (25 test) kit form and is referred to as a commercial ELISA Immunostick Raw Meat Species Screening Test Kit.



Colour Code	Species
Red	Beef
Yellow	Pork
Blue	Poultry
Orange	Horse
Green	Sheep

Conclusion

- ✓ Meat species specification is an important field of quality control management.
- ✓ All Physical Techniques are useful to detect the species of raw meat whereas other biological techniques like PCR, ELISA and RFLP are important for the processed or cooked meat.

References

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THANK YOU