

# PROTEIN AND METABOLISM

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# Proteins

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## □ Proteins,

- amino acids
- High molecular weight
- organic compounds

## □ In their structure

- carbon (% 51-55), hydrogen (% 6-7),
- oxygen (% 21-23), nitrogen (% 15-18)
- Sulphur in some amino acids
- Phosphorus, iron, zinc, copper in some amino acids

# Protein

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Leaves, stalks, roots and tubers of plants have low amounts of protein

Seeds are high in protein.

- |                             |        |
|-----------------------------|--------|
| □ Barley straw              | 9%     |
| □ Wheat, barley, oat grains | 10-14% |
| □ Soya, vetch seeds         | 25-38% |

# AMINO ACIDS

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- Hydrolysis of proteins; enzymes through acids or alkaline substances → Amino acids
- All proteins are composed of amino acids.
- Although more than 200 amino acids have been isolated from biological substances, only 25 are found in the structure of proteins.

# Sulfur containing amino acids

## Methionine, cystine, cysteine

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Hair development and growth

Methionine containing active methyl groups is a methyl transmitter.

\*Methyl groups are required in the formation of essential body components, detoxification processes, fat transport and metabolism

\* Inorganic sulfur requirements are mainly met by sulfur containing aminoacids.

\*They change the effects of toxic metabolism products and remove them from toxic properties.

\*Methionine is transformed to taurine, an essential compound in the organism.

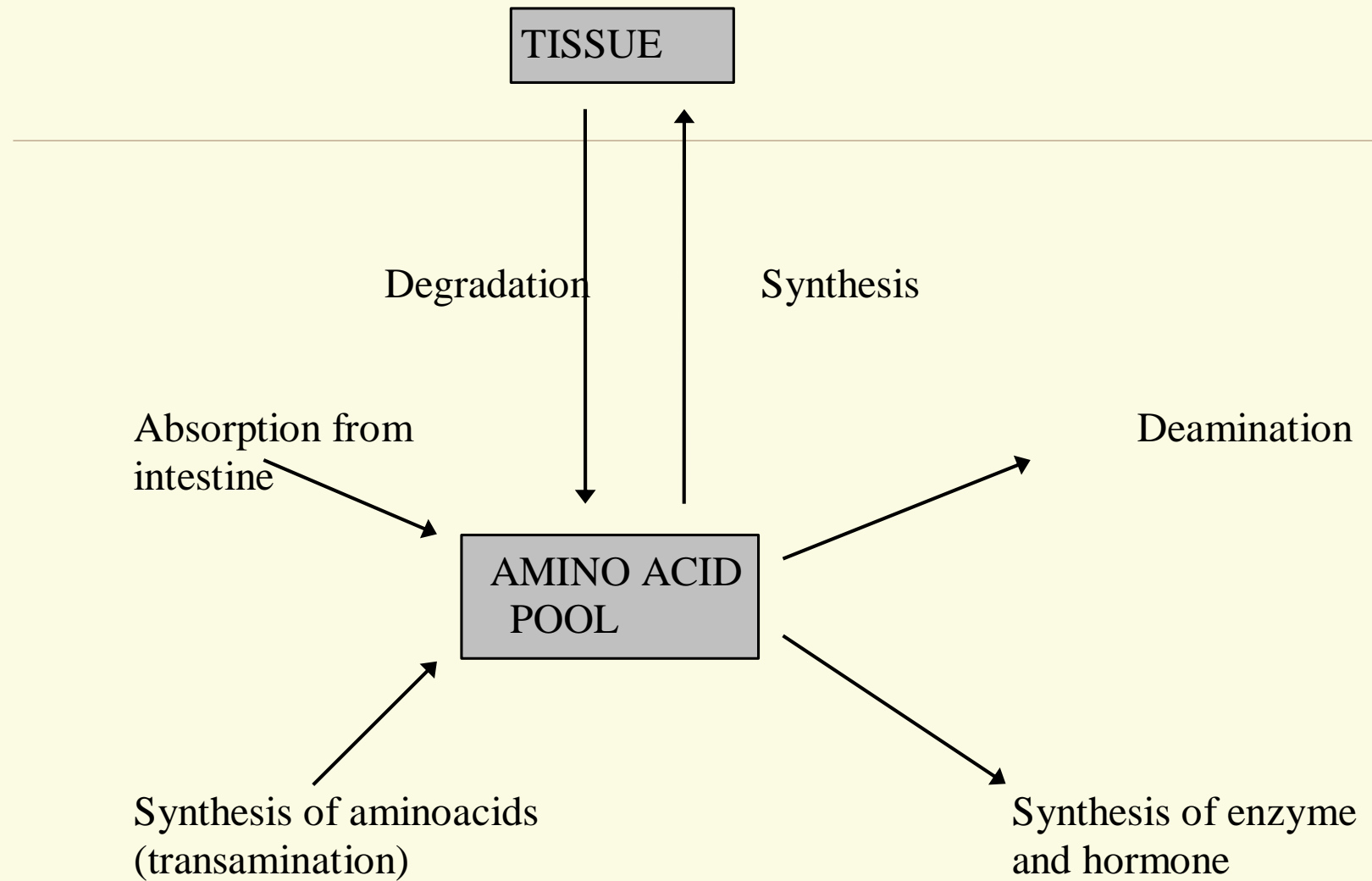
Protective effect on the liver

Lack of methionine: Liver degeneration, kidney disorders, hair loss and reduction in the resistance to infections

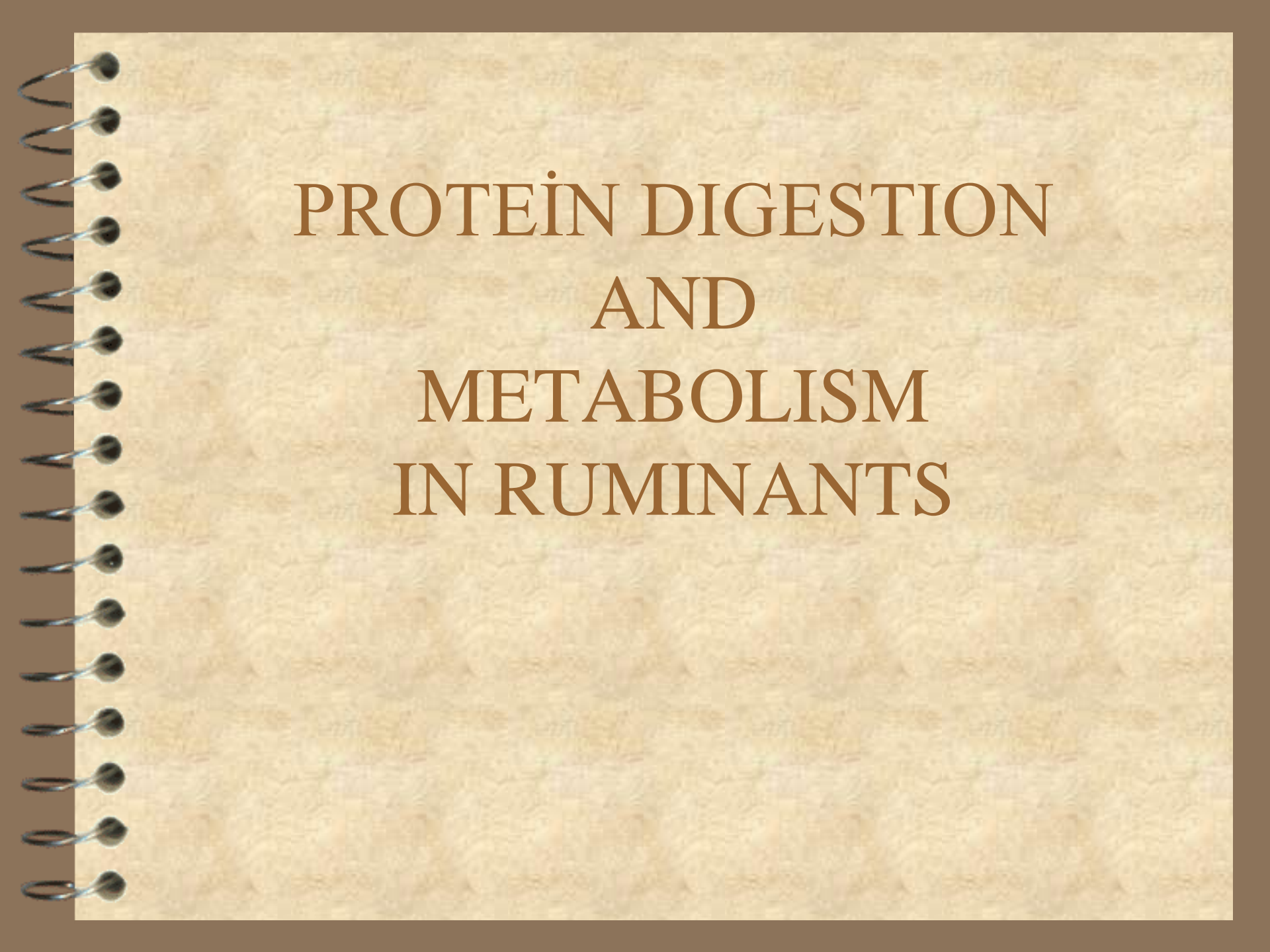
# Nutritional Factors affecting proteolytic enzyme activity

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- 1) Protein levels in diets
- 2) Presence of protease inhibitors in feeds
- 3) Exposure to high temperature



Amino acid metabolism in animal body

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PROTEIN DIGESTION  
AND  
METABOLISM  
IN RUMINANTS



Degradation of consumed protein

Mikrobial protein  
degradation

Recycled urea

Rumen  
ammonia

Mikrobial protein  
biosynthesis

Absorption to blood

Passage to the other parts  
of digestive tract



DIET

Protein

NPN

Urea

SALIVA

RUMEN

Protein

NPN

Urea

Peptids

aa

Ammonia

Ammonia

LIVER

Mikrobial protein

Aa

Urea  
Endogen nitrogen

URINE

ABOMASUM  
and  
INTESTINE

Protein

Amino  
acids

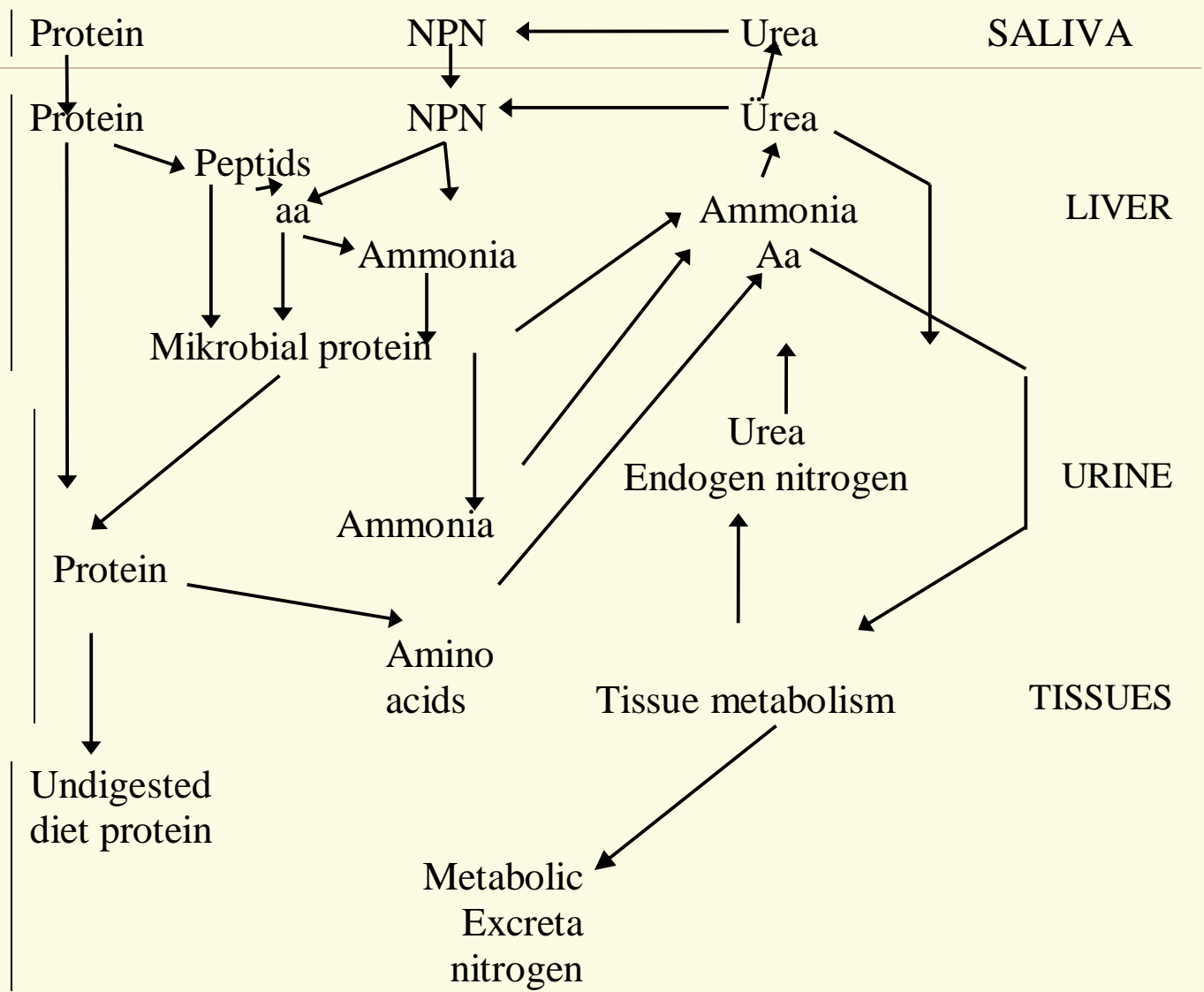
Tissue metabolism

TISSUES

EXCRETA

Undigested  
diet protein

Metabolic  
Excreta  
nitrogen





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□ MP: metabolizable protein

□ RDP: rumen degradable protein

□ RUP: rumen undegradable protein

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- Lack of RDP : reduction in microbial protein synthesis, carbohydrate digestion, feed consumption and then production
  - Excess of RDP : Fertility disorder, increases in excretion of urine and nitrogen

# RUP sources

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- Soyabean meal
- Corn gluten meal
- DDGS