Two thick, fresh salmon fillets are shown against a light blue background. The fillets are cut into a thick, curved shape, revealing the characteristic orange-pink color of the flesh and the darker skin on the bottom. The top fillet is slightly behind and to the right of the bottom one.

Protein Chemistry 3

A detailed image of a fish head, likely a salmon, is shown against a light blue background. The fish has a silvery, metallic sheen on its scales and a large, prominent eye. The head is positioned horizontally, facing left.

Ph.D Students

A.Y. Al-Dubakel

2019 -2020

Factors affecting protein requirement

- ❖ Size and age
- ❖ Fertility of the culture systems
- ❖ Levels of anagement and intensification
- ❖ Seasons
- ❖ Geographic location



Protein sources – Predominantly used

Animal proteins

- Fish meal
- Squid meal
- Clam meal
- Mussel meal
- Crab head meal
- Prawn head meal
- Squilla meal
- Silkworm pupae
- Poultry waste meal
- Slaughter house waste

Fish Meal



Squid liver meal

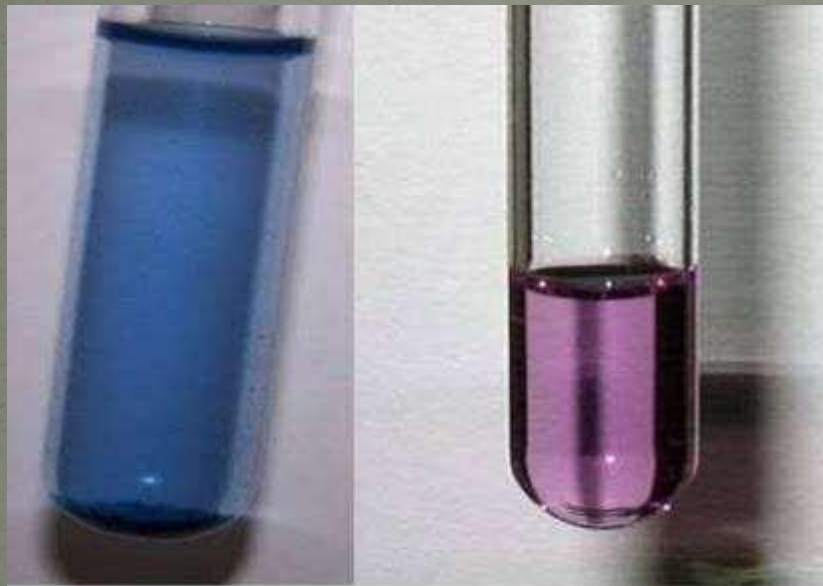
Plant sources

- Soybean meal
- Wheat products
- Yeast
- Cotton seed meal
- Peanut meal
- Corn glutens meal
- Rice bran
- Wheat bran
- Ground nut oil cake
- Tapioca flour



Protein estimation

- ❑ Kjeldhal method-higher protein
- ❑ Biuret method
- ❑ Folin- lowry's method



negative biuret
test results

positive biuret
test results



Nutritional value of proteins

Used as guide to the effectiveness of a particular protein sources in supplying animals required

3 main methods

PER

NPU

Essential amino acid index.

PER-Protein Efficiency Ratio

Relates weight gained to g of crude protein fed

$$\text{PER} = \frac{\text{g wet wt gain}}{\text{g crude protein fed}}$$

- ❑ This method makes no allowance for protein used for maintenance
- ❑ But **widely used as method of determining appropriate protein sources for fish diets**

NPU-Net Protein Utilization

most satisfactory method.

NPU= biological value × digestibility

Several technical difficulties occur when determining biological value and digestibility.

This was rewritten as

Apparent net protein utilization (Apparent NPU) Defined as the percentage of ingested protein which is deposited as tissue protein.

$$\text{Apparent NPU} = \frac{P_b - P_a}{P_i} \times 100$$

where P_b is the total body protein at the end of the feeding trial, P_a is the total body protein at the beginning of the feeding trial, and P_i is the amount of protein consumed over the feeding trial

Essential Amino Acid Index

EEA index = geometrical average of 10 essential amino acid

This is used only if the AA requirement for the given sp is known