Unit-5

Effect of cooking on Nutritive value of cereals & pulses

Bread making causes as 30% loss of B vitamins which - compensated by fortification.

Compared to Bread - biscuit & cakes has lesser vitamin losses about 10-15%.

The losses of thiamine, riboflavin & niacin - lossed - rice wash - 20-40% ; 10-30% & 15-2%.

Cooking loss are general & less serious than washing.

Excess H_2O & surplus water discarding can be avoided to prevent loss.

30% thiamin are lossed

In India - 80% of pulses are consumed in the form of dal or besan. Remaining 20% as whole seed. Cooking of pulses is time - consuming process - fuel cost - Long time to cook.

Cooking quality of pulses - functional
Cooking time - attain softness.
Cooking quality of pulses - functional % in volume after cooking.

The heat treatment during cooking helps in loosening the intracellular matrix of the middle lamella.
different cooking time - rate of cell separation

Separation of cells during cooking - loss in Ca & Mg from middle lamella.

Cooking time influences the nutritive value & overall utilisation of pulses.

Antinutrinal factor:

uncooked legumes - Rich in antinutritional - toxic when consumed in large quantity.

They are Trypsin Inhibitor, haemagglutinins & polyphenolic compounds sensitive to cooking time at atm pressure. Trypsin Inhibitor & haemagglutinins disappear at 90m.

Polyphenolic cmp ↓ time are still found in cooked Material Relatively high amounts are found in the cooking liquor. Red kidney, black gram & soyabean have highes amounts of poly phenolic compounds.

Protein quality:

Heating ↑ Protein quality by destroying anti-nutritional factors, ↑ digestability & availability of amino acids. Even after cooking digestability of cmp such as protein & carbs are less than those of cereals. Excess heat affect Nutrition quality of bean. Moist heat is preffable than dry heat. Lysine is lost when roasted, so moist heat is preffered. Heat treatment causes loss of methionine, the most improtant amino acid of legume

Minerals:

Little effect on calcium, Magnesium & total iron content of Pulses.

Vitamins:

Loss of thiamine may occur due to the heat applied.

Colour:

Sodium metabisulphite is found to be effective in Maintaining colour of lentil, other seeds acquire a darker colour during processing.

PC: cooking time is directly related to the PCMP number.

PCMP number = Free pectin + calcium + Magnesium/2 - phytin.

Milk:

Protein:

Heating - Precipitation of lactalbumin & lactoglobulin.
Lactalbumin - coagulate (66°c) & whey protein at 90°c for 5mins.

For whey, heat denaturation is an irreversible reaction.

The protein found in largest amount in milk, casein, does not coagulate at usual temperature. Casein

Coagulates at 100°c heated at 12 hours or at 135°c to- One hour or at 155°c to 3 minutes. The resistance of is because of combination of calcium, magnesium, phosphorous & citrate in milk.

Fat:

The layer of fat form on milk - boiled - result of fat globules in unheated milk.

Sugar - protein Mixture

Non-enzymatic. - evaporated milk.

Lysine has maximum effect. Glucose reacts with lysine followed by tryp.tophan & arginine.

Steps:

*) Condensation of the aldehyde or ketone
*) Rearrangement of condensation
*) Dehydration of rearranged products
*) Further degradation
*) polymerisation to brown pigments.

Acid:

acidity ↓ when milk is heated - release of dissolved CO_2 & then ↑ bcoz H. ions liberated when calcium & phosphate forms insolable compounds.

Minerals:

*) The dispersion of calcium phosphate in milk ↓ by heating & part of it is precipitated.

*) Iodine is voltaile substance - lost when heated.

Vitamins:

The fat soluble vitamins A & D are thermostable. The loss of vitamin C is minor importance as milk is not an important source of this vitamin.

Meat:

*) Destroy M.O that have contaminated. Live trichinae - heating 55°C.

*) Cooking - colour of Meat. Fresh meat cooking - protein pigments are denatured. Denaturation of protein - haem pigment from globin - free haem is very sensitive to oxidation.

On heating, red meat → brown due to oxidised pigment in meat.

* Heat treatment brings about enzyme inactivation. Ideal cooking meat should minimise the hardening of contractile protein & maximise the softening of the connective tissues.

* Flavour compounds - produced or changed on heating. Proteins & free acids of meat on heating produce some volatile break down products. These include sulphur containing compounds, aldehydes, ketones, alcohols, amines & others. Lipid-volatile compound (breakdown).

These volatile compound - fat & lean - contribute to flavour & odour

* Meat contains high % H_2O. Only small amount is bound together, rest as free molecules within the muscle fibres & connective tissues. Heating reduces the water holding power of meat & juiciness. The loss H_2O will not bring any changes in nutritive value.

* Nutritive value remains high. Normal cooking doesn't lead to loss of minerals & protein. There is some loss vitamin B.

Fish

Changes during cooking - similar - cooking meat. The main diff-is colour change of fish than meat during cooking. Since fish has lesser connective tissues cooking time is lesser when compared to meat. The coagulation begins at 60°C. The flesh of fish is sufficiently cooked when it falls easily to clumps of snowy white flakes when tested with fork.

Fish - ↑ Temp - long time - muscle protein to shrink leaving the fish tough, dry & lacking in flavour

Fruits / Vegetables:

Loss during cooking

*) Mechanical loss
*) Solvent action of H_2O
*) oxidation & chemical decomposition

*) Mechanical loss

. Pre-preparation such as vitamins under skin is lost.

Vegetables like carrot have valuable nutrient - peeling loss

. Throwing away outer wayleaves will lead to loss of Carotene. Beetroot, carrot & cauliflower leaves are very Nutritious hence, discarding will result in nutrient

loss.

1) Solvent action of water.

Water soluble nutrient like thiamine, riboflavin, nicotinic acid, Pantothenic acid, Pyridoxine, folic acid. Vitamin c may dissolve in H_2O.

2) Oxidation & chemical decomposition.

Loss of nutrients - chemical comp - Reaction of. cooking H_2O or heat.

Enzyme - ascorbic acid oxidase - separated from ascorbic acid - processing like chopping, pounding will- access to enzyme - destroy vitamin.

Vitamin c - Oxidisable - accelerated by heat.

Vitamin A - oxidised - Heat