

VALORISATION OF CHICKEN FEATHERS:



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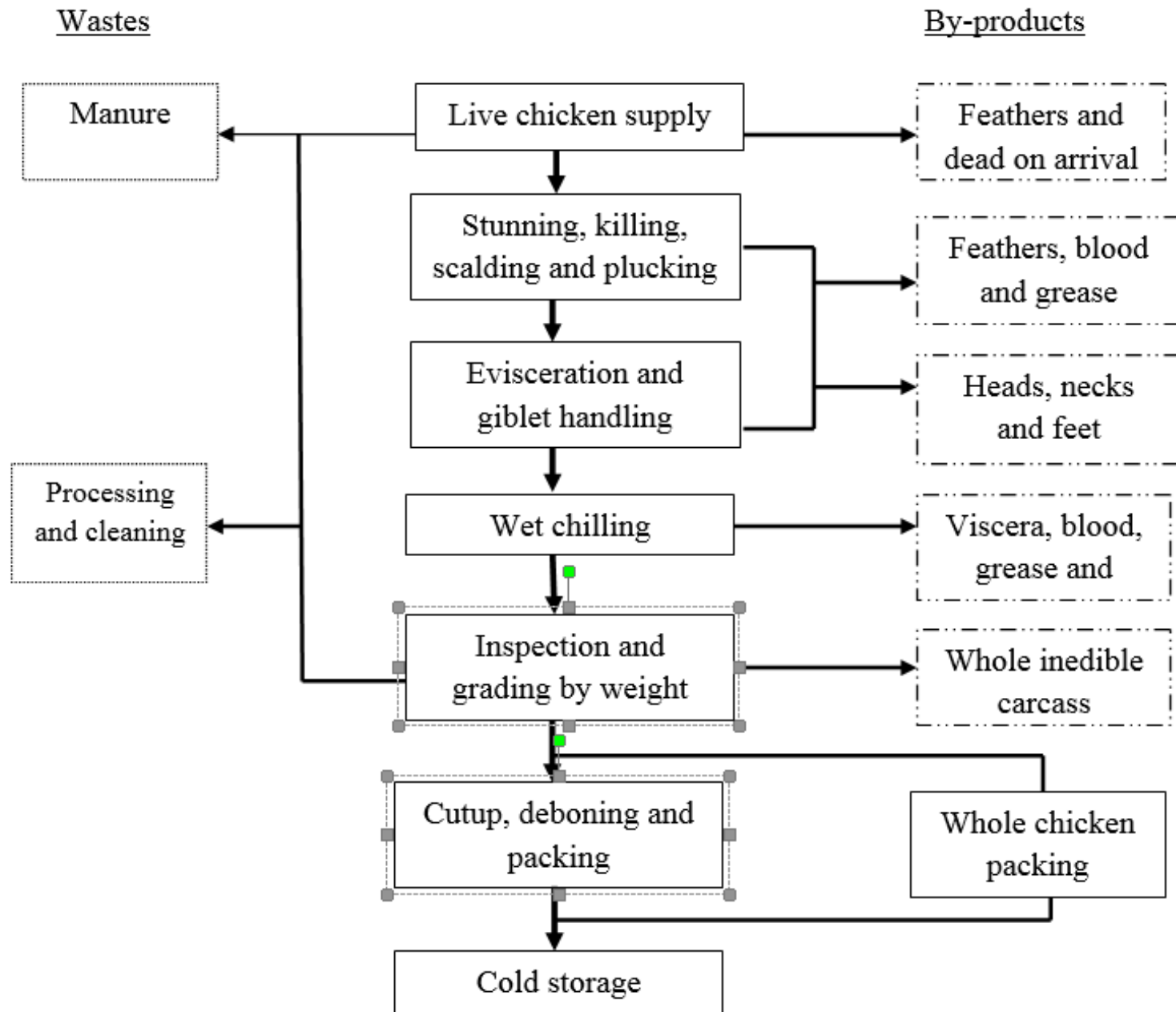
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Chicken Processing



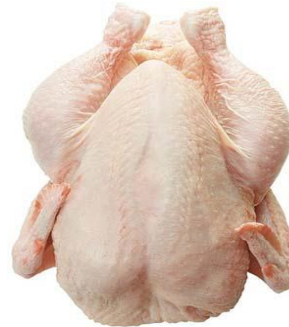
Why Chicken Feathers?

Human beings do not consume chicken feathers (...at least not on purpose!)



20-22% Other wastes
(blood, head, feet, viscerae, bones)

45 g to 2.5-3.0 kg after 42 to 45 days - They are slaughtered (Appleby, 1992).



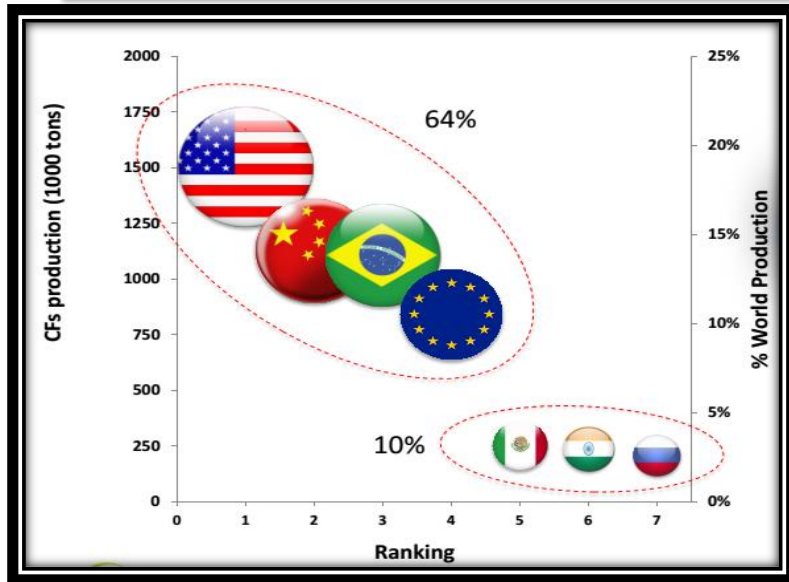
68 -72 % meat



8-10 % feathers

More than 20 billion pounds of
feathers annually

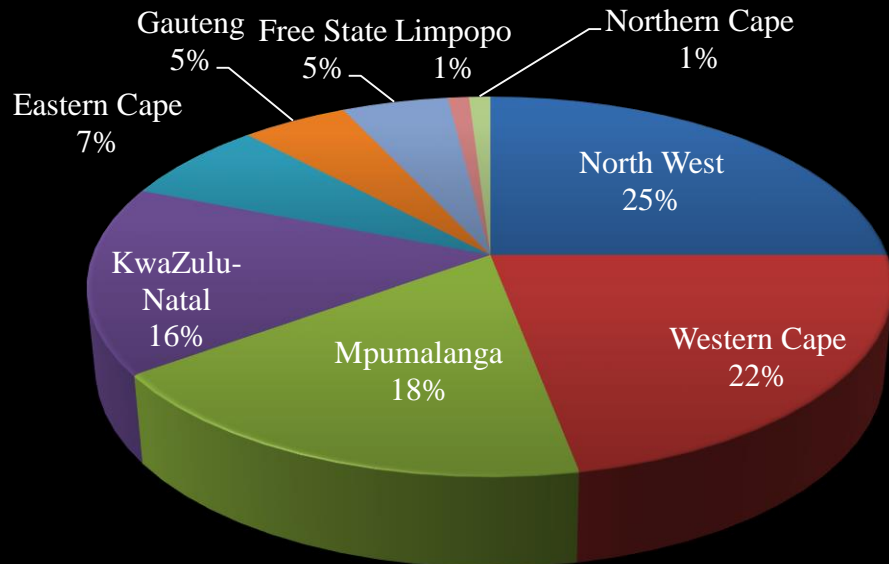
World poultry production



- Broiler chickens: **58 billion chickens**
- **46.6 billion lbs chicken meat in USA**
- **20 billion pounds feathers**

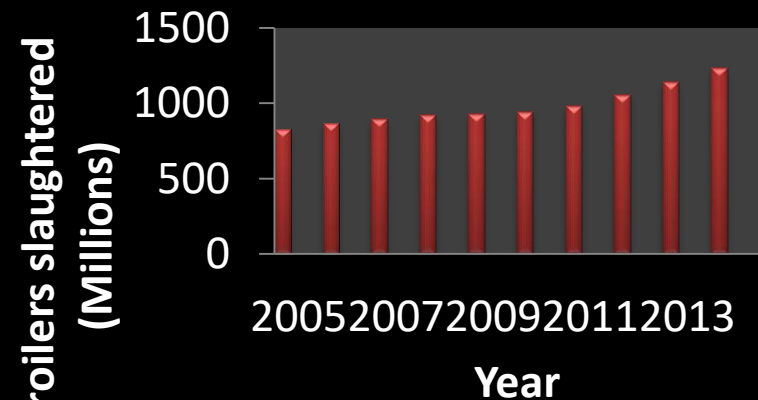
275 broiler producers and 231 contract growers, (SAPA, 2013).

528 million pound chicken feathers/annum



Distribution of slaughtering-SA

Broilers slaughtered in SA



UTILIZATION OF FEATHERS:- Present Scenario

- What to do with the more than 20 billion pounds of poultry feather waste generated each year?



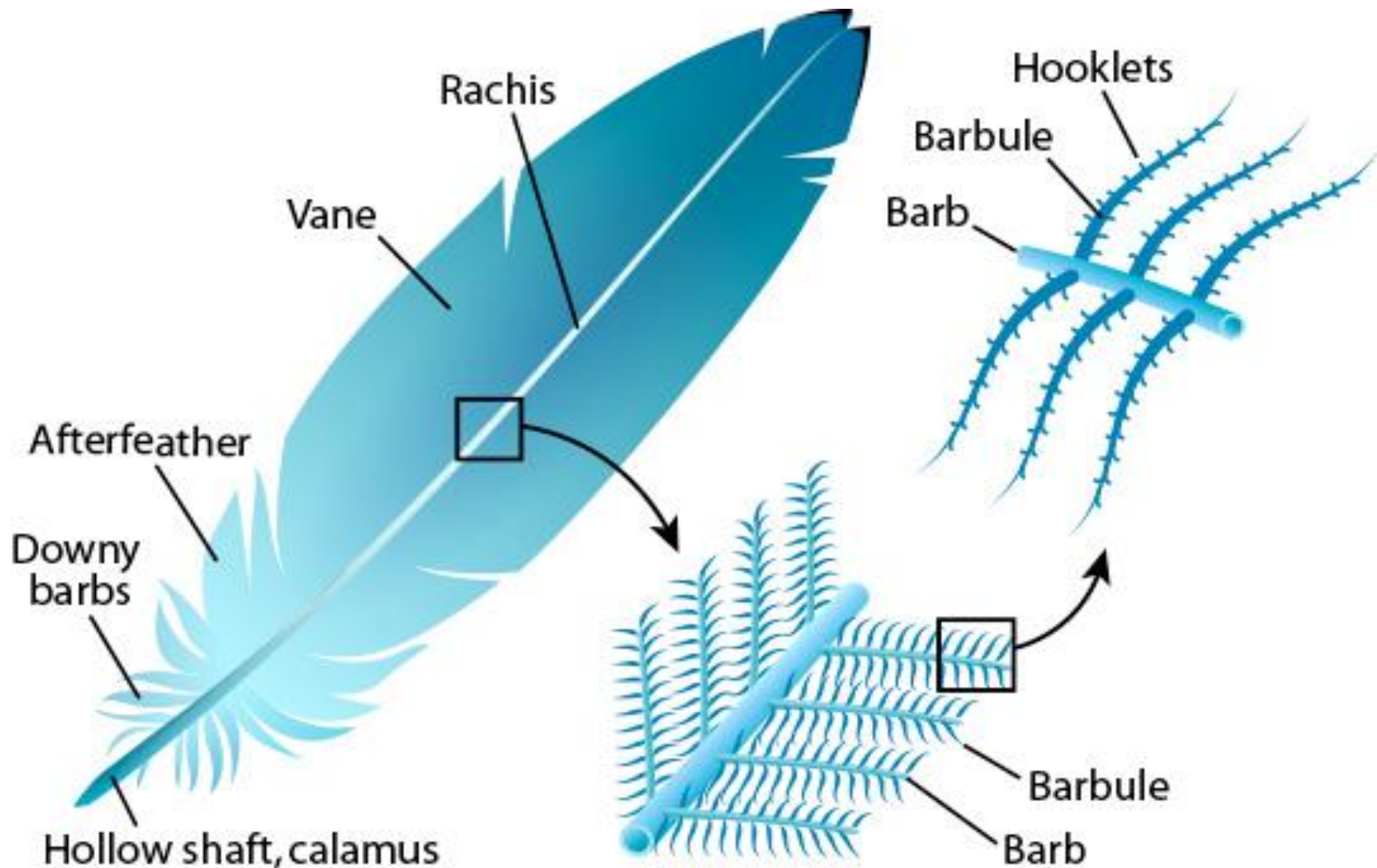
Disinfection

Physical properties

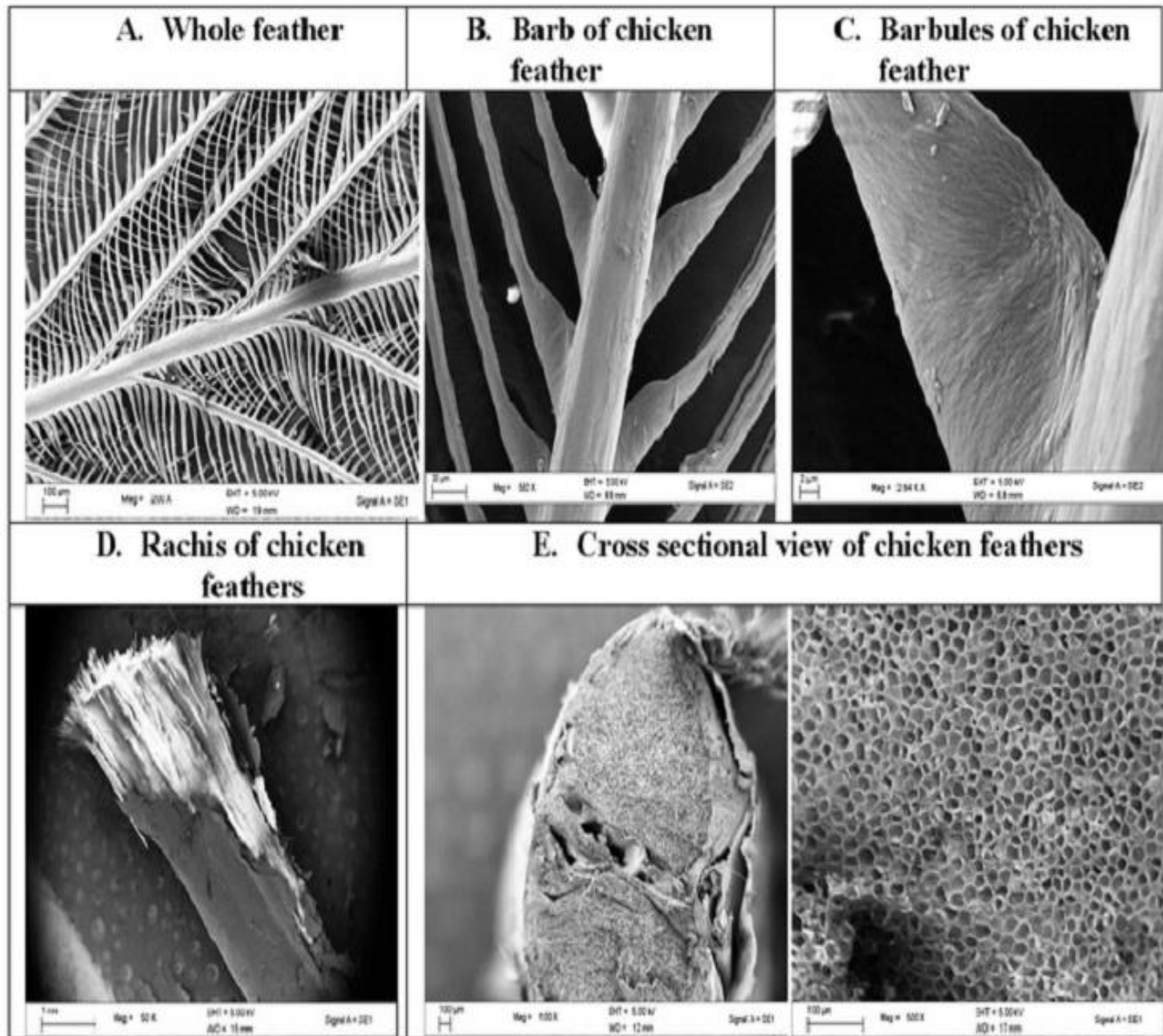
Chemical properties

Valorisation routes

STRUCTURE OF FEATHERS



Morphological structure

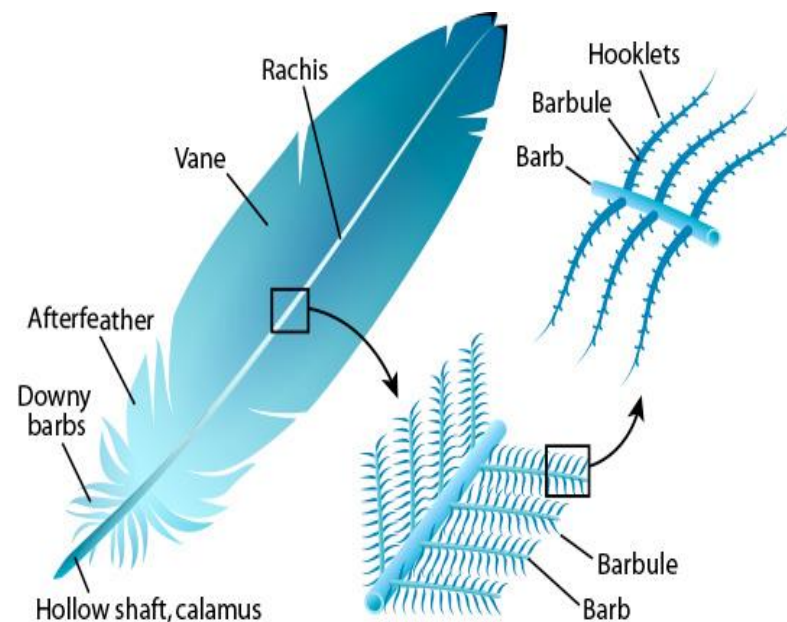
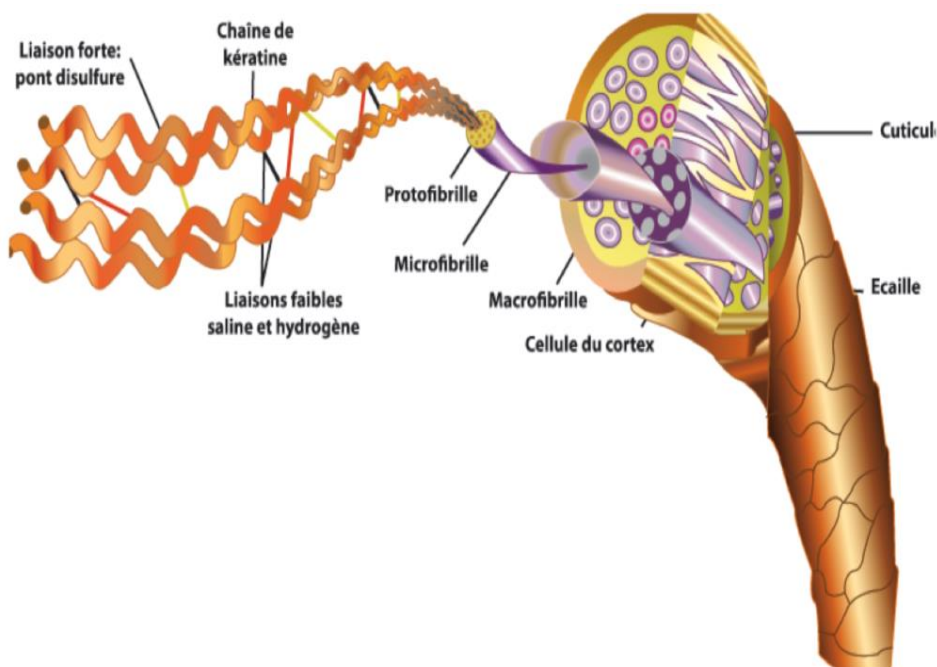


CHEMICAL PROPERTIES

Functional group	Amino acid	Percent content
Positively charged	Arginine	4.30
Negatively charged	Aspartic acid	6.00
	Glutamine	7.62
Hydrophobic	Tyrosine	1.00
	Leucine	2.62
	Isoleucine	3.32
	Valine	1.61
	Cysteine	8.85
	Alanine	3.44
	Phenylalanine	0.86
	Methionine	1.02
Hygroscopic	Threonine	4.00
	Serine	16.00
Special	Proline	12.00
	Asparagine	4.00

Structure of Chicken feathers

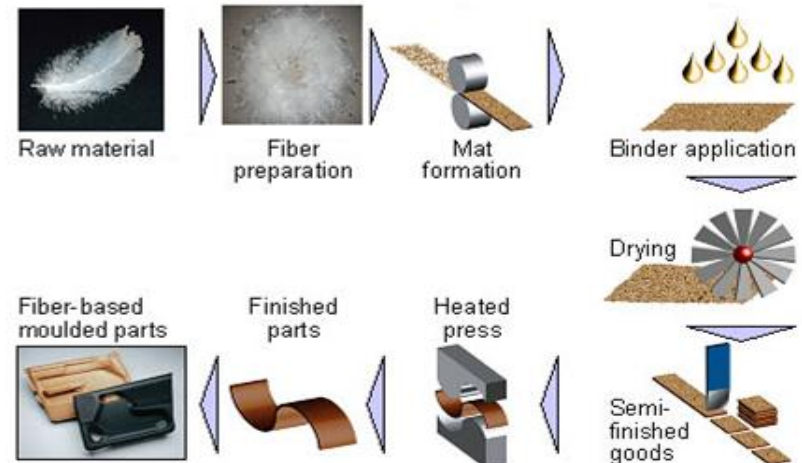
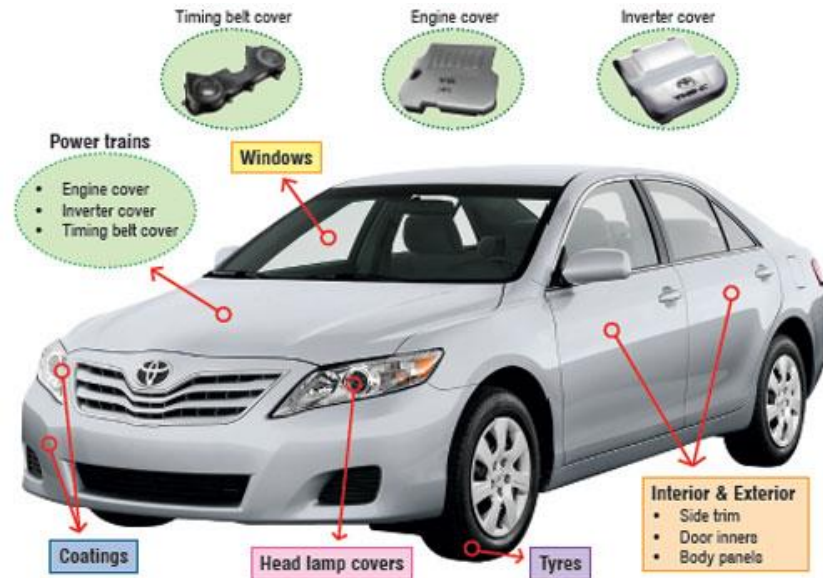
- **Low density** - No natural or synthetic fibres can compete
- Excellent compressibility, sound dampening, and warmth retention



Composition of chicken feathers:

- **91% protein (keratin) 1% lipids, and 8% water.**
- Disulphide bonds, hydrogen bonds, covalent bonds, salt linkages and cross linkages (Schmidt, 2001).

UTILIZATION OF FEATHERS:- Future prospects

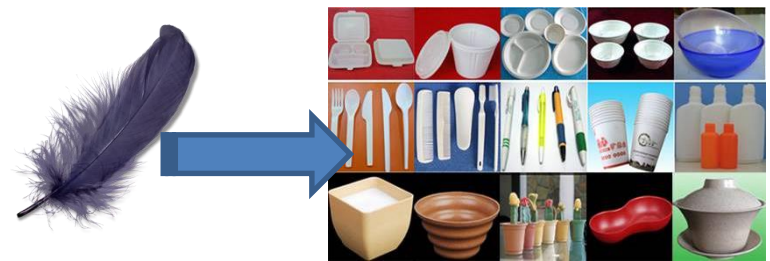
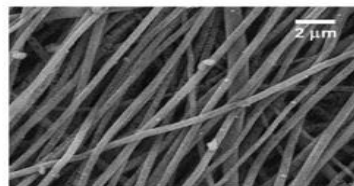
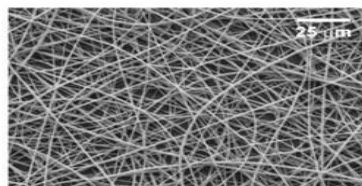
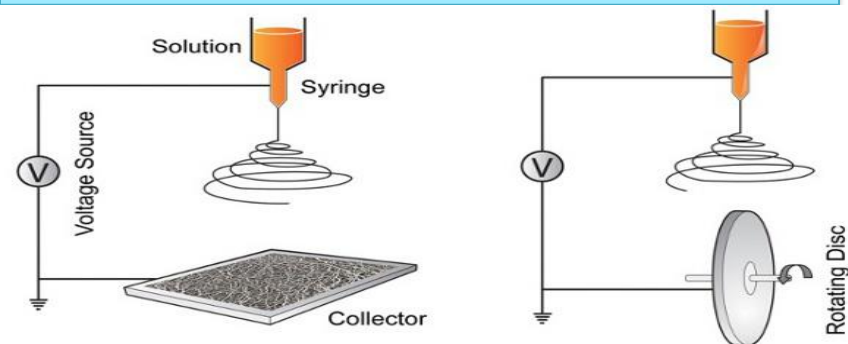


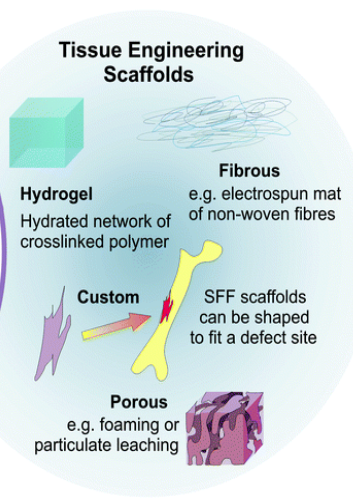
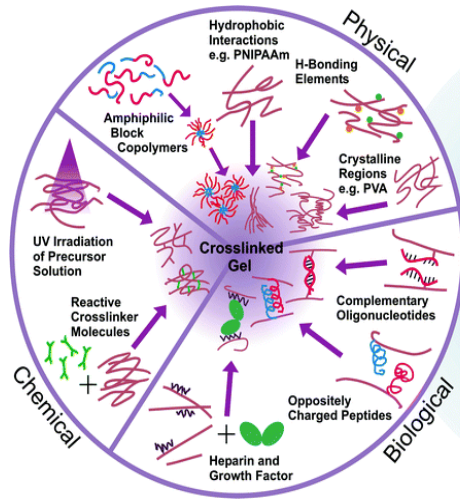
Over 99% of everyday plastics are derived from oil based non-renewable resources



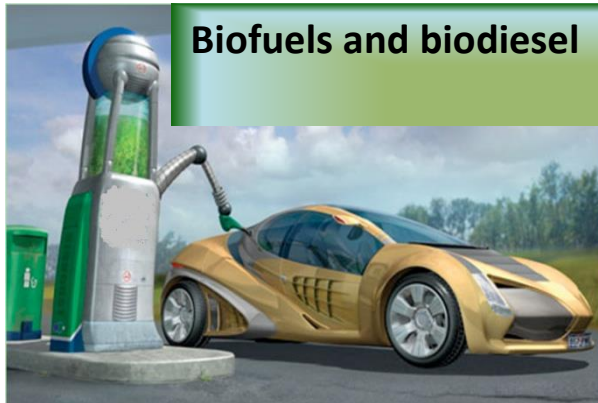
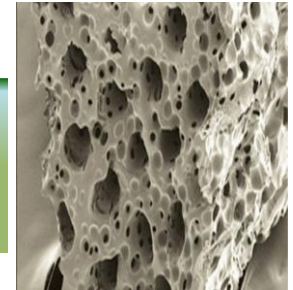
Biodegradable plastics

Feather fibers, yarn and fabrics
Blending with other fibers





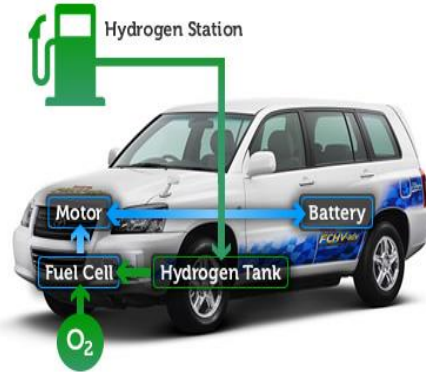
Biomedical Engineering



Biofuels and biodiesel

Fuel Storage

- strong, lightweight, hollow tubes.
- more porous after heating
- Increased surface area



Packing material

The feathers used to produce bioresin plastic

Water purification

- Sponges





Pharmaceuticals

Fats: cholesterol source → synthesis of **vitamin D3**
Steroid pharmaceuticals

Construction industry

MATRIX MATERIAL



Chicken Feathers

+

BIOPOLYMERS



MATRIX MATERIAL



+

Heat

Without Biopolymer



Cosmetics

For skin:- increases skin elasticity and hydration.

For hair:- moisturising properties



Paper industry and Filtration



Geotextiles

- **Stiff and rigid:**
- **restricts soil erosion**
- **Increases soil moisture content**



Conclusions

- **Low cost, large availability and unique properties**
- **Increase national security by decreasing reliance on foreign oil resources.**
- **Minimize environmental pollution**
- **Enhance economic benefits for the poultry producers, processors, and stimulate development of feather product industries.**

