



A MINI-REVIEW ON THE CHARACTERISTICS AND MANAGEMENT OF POULTRY

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ABSTRACT:

The review explains the trend in poultry management at Indian market. This review provides all the information about processing, production, feeding, diseases attack and its controlling measures and market trends. Poultry is essential livelihood of farmers which provides an income to fulfill their needs. Demand for the poultry meat grows dramatically due to high consumption rate in present growing population. There is necessity to have supplementary nutritional intake through meat consumption. In general the poultry industry has vital role in improving human nutrition and generating micro and macro business. Especially, small income business for women and manure supply for the agriculture has a predominant role in Indian economy. In order to maintain the nutritional values, the supply of quality feed ensures the health of animals. The amount of feed and its nutritional requirements vary based on weight and age of the chicken, their pace of development, their amount of egg production, the climate (cold or rainy weather induces increased energy expenditure), and the quantity of nutrition obtained through foraging. This review articles has general information of poultry products and information like food grade, poultry diseases, pests' control.

KEYWORDS: Poultry, Feed, Income, Diseases, Processing, Preservation.

INTRODUCTION:

Poultry meat is the one of the fastest-growing factor in global meat production, consumption and marketing. Due to population growth, there is a strong need for chicken meat consumption. The impoverished and landless in the emerging nations owns chicken farming. Also, women typically own and manage poultry to fulfill out their family needs. Family poultry farming is one of the methods that help to increase the production for the world's rapidly growing population. Since farmers usually consider poultry production as a secondary sector to other agricultural activities because it plays an important role in providing the additional income. Villagers use chicken for pest control in agricultural lands, fertilizer production, specific festival requirements and many other ancient activities. Poultry is the fastest-growing industry in the livestock sector for increasing the supply of proteins, lipids, minerals, and vitamins from natural sources. For the production of eggs and meat, a local variety of poultry has raised. Importing healthier varieties of poultry is required to increase supplies in response to the increasing demand for poultry meat [1, 2]. The two most important qualities for poultry meat are texture and appearance. The initial selection of the product and satisfaction with the product

are based on its appearance. The important sensory characteristic determining the evaluation of final quality of poultry is texture. Skin color, meat color, cooked meat pinkness, and appearance defects such as wounds and blood clots are to be considered as characteristics of appearance to determine the quality. Consumers expect health benefits from all the products, including poultry meat. The meat contains a valuable source of nutrients, and consumers accept it. At the same time, microbial growth, drug residues, and allergic components present in poultry meat cause health problems [3, 4]. Consumers are willing to pay a premium for healthy products. Consumers anticipate that poultry meat will be produced in a natural manner. All steps taken to ensure the prevention of any type of disease on poultry farms are known as "bio-security." With rising demand for chicken meat and eggs, India's poultry industry is expected to continue to grow and industrialize. In previous years, 200–500 chicks per cycle were generally manufactured by broiler farms. But production of 5,000 to 50,000 birds per week cycle units are common today. Chicken dominates poultry production in India [4, 5].

TABLE 1: NATIVE CHICKEN BREEDS OF INDIA [5]

FOOD GRADE OF POULTRY:

It is important to understand the difference between USDA Poultry, Meat Inspection and USDA Meat and Poultry Grading. The USDA's Agricultural Marketing Service manages the voluntary meat and poultry grading programs. These grading schemes divide animals and meat products into small, more related groups based on variables that evaluate the consumer's acceptance of various meats, their flavor value, and the yield of lean meat. The Food Safety and Inspection Service of the USDA regulates the production of nutritious and safe meat and poultry products through required systems called Meat and Poultry Inspection. The cost of grading is handled by the meat processor: however, the government's meat and poultry inspection systems are supported by American taxpayer money. To divide trade cows, sheep, swine, and poultry into more controllable, homogenous groups, voluntary grading systems have been established and put into use [6].

FEEDING OF POULTRY :

Nowadays, feeding poultry is more expensive than feeding livestock. Utilizing low-cost local components, it was found that the cost of poultry feeds could be reduced by creating the least expensive feed composition. The effort to reduce the costs of feed could result in a significant decrease in the total cost of production because feed represents about 60 percent to 70 percent of all production costs. Low-cost poultry production is an advantage for marginal and small farmers, given the demand for eggs and meat in these years. Since complex carbohydrates constitute a significant portion of fibrous byproducts, it is necessary to identify ways to better use these materials so that they can be added to poultry feed without having a negative effect on the health and productivity of the poultry [7]. Although improvements in health, nutrition and environmental management have been contributory factors, the majority of the change can be attributed to genetic improvement. Geneticists will continue to make improvements to the performance of broilers, probably with emphasis on welfare and the ability to cope in widely different environments [8].

TABLE 2: MAJOR GRAINS ARE USED AS POULTRY FEED AND THEIR COMPOSITIONS

TABLE 3: REQUIREMENTS FOR CHICKEN FEEDS (on dry basis) [16]

CURRENT SCENARIO OF POULTRY PRODUCTION IN INDIA [7]:

The poultry sector has been one of India's biggest success stories during the last 10 years. The poultry business in India employs around 20 million farmers and about 1,000 hatcheries. Poultry output has expanded at a rate that is 8 to 10 times quicker than agriculture production, which has grown at a rate of roughly 2% per

year during the last 2 to 3 decades. The local market has also showed rising signs of stability, thanks to a developing rural market backed by lower feeding and chicken prices, market expansion, and greater awareness of new technology and procedures in the sector. Even Nevertheless, urban requirements continue to drive 80% of domestic spending [7]. A fuzzy multi-objective genetic algorithm was used for solving the issue of the trade-off between time, cost and quality in broiler production. High costs of production, high food exchange coefficient in Iran in comparison with developed countries, high mortality of chickens during the growing period and fluctuations in the price of the animals' feed, make, as for other processes, an effective control and management system necessary [17].

TABLE 4: THE DIFFERENCE BETWEEN FRESH AND FROZEN CHICKEN MEAT [18,19,20]

TABLE 5: POULTRY AND EGG PRODUCTION BY DEVELOPED AND DEVELOPING COUNTRIES [21,22,23]

TABLE 6: PER CAPITA CONSUMPTION OF POULTRY IN POUNDS [24, 25]

OVERVIEW OF THE POULTRY PRODUCTION TECHNOLOGY:

FIGURE 1: FLOW CHART OF POULTRY FEED PREPARATION [26]

FIGURE 2: FLOW DIAGRAM BETWEEN THE COMPONENTS OF VERTICALLY INTEGRATED POULTRY COMPANY [27]

The feed are prepared with proper composition and the hatched chicks are grown in the separate plant. The feed should be provided in proper quantity and in proper time. The broiler chickens are grown properly with proper feed and caring labors. The finished product of grown poultry is allowed for the market distribution. They are converted into several types of products. The breeds should be grown properly with proper ventilation.

FIGURE 3: FLOWCHART FOR POULTRY MEAT PROCESSING [16]

The fresh poultry bird has been taken for the poultry meat processing. It will be stunned electrically or chemically in the shackles. After that they are submerged in the water at 65.56°C and the feathers are removed using the rubber fingers. The head, feet and the internal organs are removed. Afterwards their body parts are allowed for the chilling process to prevent the microbial growth. As well as they are cut into pieces are packaged and stored for the marketing.

POULTRY DISEASES:

1. BLACKHEAD DISEASES (HISTOMONOSIS):

This illness is lethal to turkeys but less effect to chickens. *Histomonas meleagridis* caused was initially recognized as a deadly illness in turkeys in 1893. Histomonosis in hens is frequently associated with an *E coli* infection that causes salpingitis and peritonitis. This form of sickness has no particular therapy [35]. Coccidiosis, trichomoniasis, leukosis, mycosis, and other intestinal disorders can also develop lesions that look like blackheads [36]. Various experimental experiments have proved that the aminoglycoside antibiotic

paromomycin efficiently lowers the severity of sickness when provided prophylactically [35]. Lindquist (1962) originally described it. There are several advantages in using the isolation strategy. It is simple, inexpensive, rapid and does not require special equipment [36].

2. COCCIDIOSIS:

Coccidiosis is regarded as one of the most costly infectious illnesses of poultry [37]. Coccidiosis is an illness cause by parasite of the genera *Eimeria* and *Isospora* of the phylum Apicomplexa, which have a complex life cycle and mostly affect the digestive tracts of various animals and birds. It has a significant economic impact in agricultural animals, particularly chickens. Because birds are grown in huge numbers and at high densities, this parasite does the most harm [38]. Immunization with vaccines is another efficient strategy, although in poorly managed chicken production systems, particularly in broiler, immunizations can cause severe responses. Coccidiosis management has mostly depended on chemoprophylaxis. So far, live vaccinations have shown to be the most reliable and effective anticoccidiosis option [38]. Natural antioxidants, especially herbal antioxidants, have been shown to promote health by reducing oxidative stress, which is implicated in the pathophysiology of various illnesses in living animals, including coccidiosis in chickens [37].

3. INFECTIOUS BRONCHITIS:

Infectious bronchitis (IB) is primarily a respiratory infection of chickens. There are three clinical manifestations of Infectious Bronchitis Virus (IBV) infection are generally observed in the field, namely: respiratory disease, reproductive disorders and nephritis. In broiler chicks of between two and six weeks of age, the main clinical signs are difficulty in breathing, tracheal rales, coughing and sneezing with or without nasal discharge. A generalized weakness is observed, accompanied by depression. Feed consumption and body weight are markedly reduced. Clinical signs in uncomplicated infections contain short duration, commonly lasting less than seven days. No risks to human health are suspected or have been demonstrated to arise from Infectious Bronchitis Virus IBV [39]. The pathogenicity of IBV can vary widely between strains. The clinical outcome of an infection in chickens depends on many variables such as the virus strain and types as sex and age of the chicken, immune status (vaccination, immune suppression, and maternally derived antibodies), co-infections and environmental circumstances such as climate, dust, ammonia and cold stress [40]. Ideal management includes strict isolation, high bio security, and repopulation with only day-old chicks, commonly the cleaning and disinfection of the poultry house and equipment in contact with poultry or poultry litter and composting or removal of the feces from the premises are done. Because IBV is highly infectious, immunization is needed in many areas in an attempt to prevent production losses due to IB [40]. The only practical means of controlling IB is vaccination. Vaccine immunity is not long-lasting and re-vaccination is necessary, the selection of an appropriate antigenic type for the region is important, given the existence of wide antigenic variation. The timing and method of vaccine application will vary for different flocks and may require adjustment according to practical experiences [39].

4. CLOSTRIDIUM PERFRINGENS:

Clostridium perfringens is caused by antibiotic growth promoters used to help broiler chickens gain weight. *Clostridium perfringens* illnesses in chicken can manifest as either acute or subclinical illness. *Clostridium perfringens* is a Gram-positive anaerobic spore-forming bacteria that may generate a variety of toxins and enzymes that cause the lesions and symptoms [41]. Clinical symptoms range from mild to severe, leading in decreased weight growth, insufficient nutrition conversion, and unusually high death rates [42]. *Clostridium perfringens* can cause two types of foodborne infections in humans: type A diarrhoea and type C necrotic enteritis. Both are produced by enterotoxin-positive *Clostridium perfringens* type A and *Clostridium*

perfringens type C strains [41]. Plant materials are commonly utilized in ancient medical systems. Plant extracts, or phytobiotics, have been used in animal nutrition for their antibacterial, anti-inflammatory, antioxidant, and antiparasitic properties. Plant extracts are usually thought to be safe and efficient against a variety of germs [42].

5. BACTERIAL PATHOGENS:

Meat is a favorable substrate for bacterial development due to its high moisture content, abundant in nitrogenous substances (essential amino acids, proteins), and strong supply of minerals, vitamins, and other growth factors. Chicken and poultry meat are frequently discovered to be infected with potentially harmful microbes such as Salmonella, Campylobacter, S. aureus, E. coli, and Listeria. However, Salmonella, Campylobacter, and, to a lesser extent, Listeria are thought to be the most common food-borne diseases in the chicken sector [43]. Viruses, including bacterial diseases, have also been discovered in and spread by trash [44]. Small chicken flocks may operate as reservoirs of avian and zoonotic infections due to restricted access to veterinarian services, insufficient biosecurity techniques, and greater risk of interaction with wild birds. [45]. Deterioration of poultry and poultry products should be avoided during handling, slaughter, and preparation to protect the public from infections and illnesses [43].

TABLE 7: COMMON POULTRY DISEASES

6. NEW CASTLE DISEASE VIRUS:

Backyard production techniques need lax biosecurity and a significant risk of infectious illnesses such as Newcastle disease or zoonosis [46]. The most significant impact of ND may be on village or backyard chicken production [47]. Newcastle disease is a serious infectious chicken illness caused by severe strains of Avian Paramyxovirus -1, a single strand nonsegmented negative sense RNA virus. Newcastle disease is an infectious bird illness that can be transmitted to humans and affects many domesticated and wild bird species [46]. The protective immunological response to ND vaccination of chickens appears to be transitory [47]. NDV vaccinations stimulate an immunological response that decreases or eliminates clinical illness and death associated with ND [48].

7. ROTAVIRUS :

Rotaviruses (RVs) are the most common gastrointestinal pathogens in people and animals worldwide. The RVs found in the environment enter the body by ingestion, following which replication begins, mostly in the mature villus epithelium of the small intestine [49]. Rotavirus groups F and G have been isolated from the intestinal contents of broilers and turkeys, either with and without apparent signs, using polyacrylamide gel electrophoresis and, more recently, PCR and nucleotide sequence analysis [50]. Rotavirus has been identified in chickens, turkeys, pigeons, ducks, and pheasants, with or without symptoms. [51]. Maternally derived antibodies against RV are passively transferred to the avian embryo through egg yolk. This antibody titer progressively decreases in serum and is undetectable at 34 weeks of age [49].

TABLE 8: PARASITES TRANSMISSION [35]

REASON FOR FREEZING & THAWING THE PACKAGED MEAT [53]:

The development of high-quality, consumer-appealing meat is intended to improve profitability for meat producers and, as a result, boost the overall meat sector. The method of frozen meat is employed to enhance its shelf life. The water percentage of meat is mostly influenced by freezing and thawing. As global trade grows and the gap across producer and consumer grows, so does the necessity to froze meat for transit.

FUTURE PERSPECTIVE:

In 2050, it is predicted that there will be 9.6 billion people on earth, 70% of whom will live in cities, and annual incomes could rise by 2%. The yearly growth rate of poultry meat is expected to be 1.8% globally and 2.4% in developing nations by 2050. While the demand for beef and pork may rise by 66% and 43%, respectively, the demand for chicken meat is predicted to rise by 121%, and the price of eggs may rise by 65% [54].

CONCLUSION:

Despite a number of challenges experienced over the years, India's poultry production has continued to grow in a spectacular manner. India's poultry production expects additional growth and industrialization due to the rising demand for chicken meat and eggs. It has a key role in providing secure livelihoods and economic opportunities for millions of smallholder farmers and poor people. Small-scale poultry farming established in the backyards of rural homes will improve the nutritional and standards based of the rural population. Although the basic issues of appearance and texture are still critical quality issues and it is controlled by many ways. The present development in the technologies and inventions will reduce the problems faced in the past. This study clearly contains all the informations of poultry management in past and present scenarios. The current technologies are more useful to prevent and control the diseases of poultry. These technologies also increase the production of poultry.

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FIGURE OF CONTENT:

FIGURE 1: FLOW CHART OF POULTRY FEED PREPARATION

FIGURE 2: FLOW DIAGRAM BETWEEN THE COMPONENTS OF VERTICALLY INTEGRATED POULTRY COMPANY

FIGURE 3: FLOWCHART FOR POULTRY MEAT PROCESSING

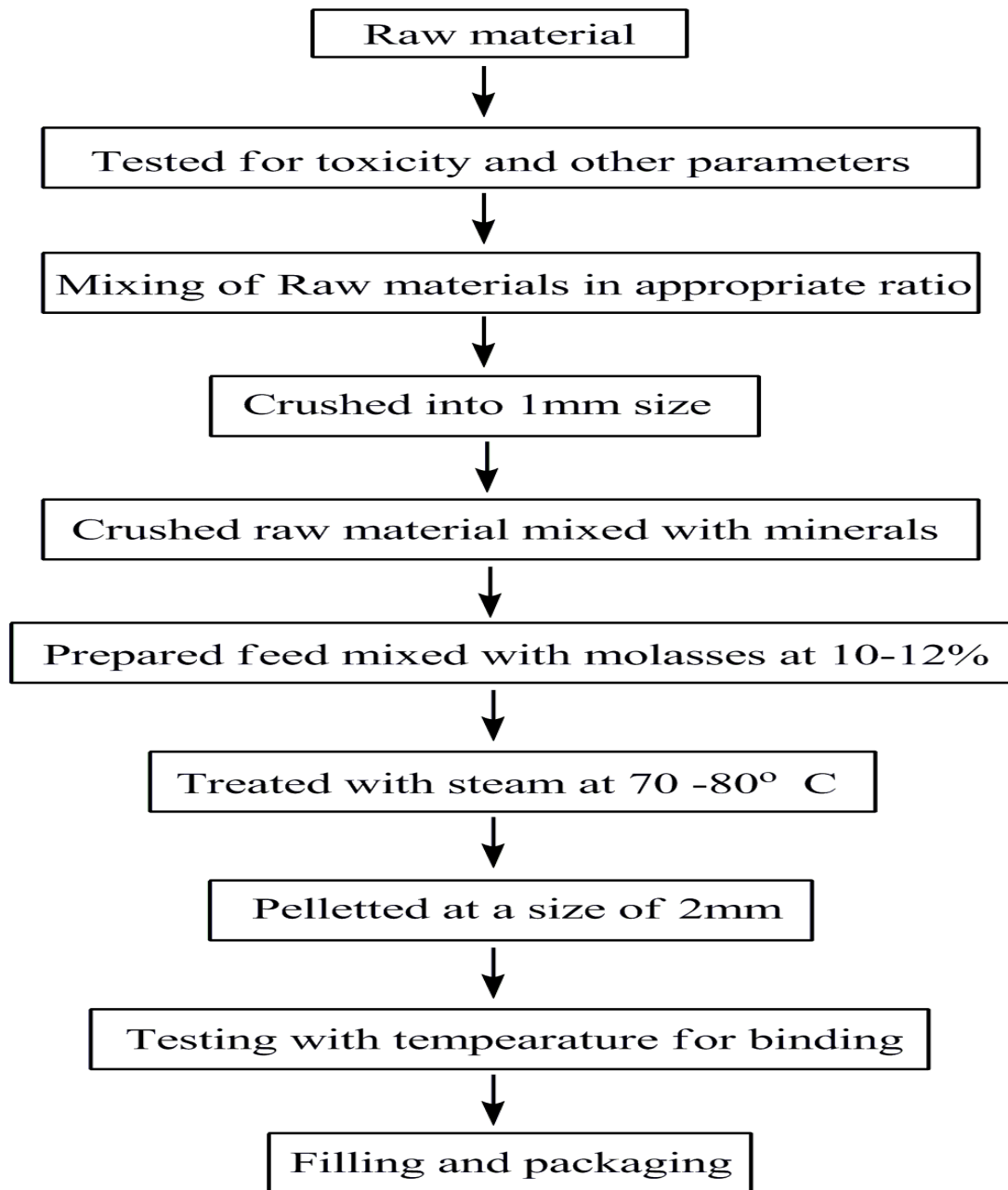
FIGURE 1: FLOW CHART OF POULTRY FEED PREPARATION [26]:

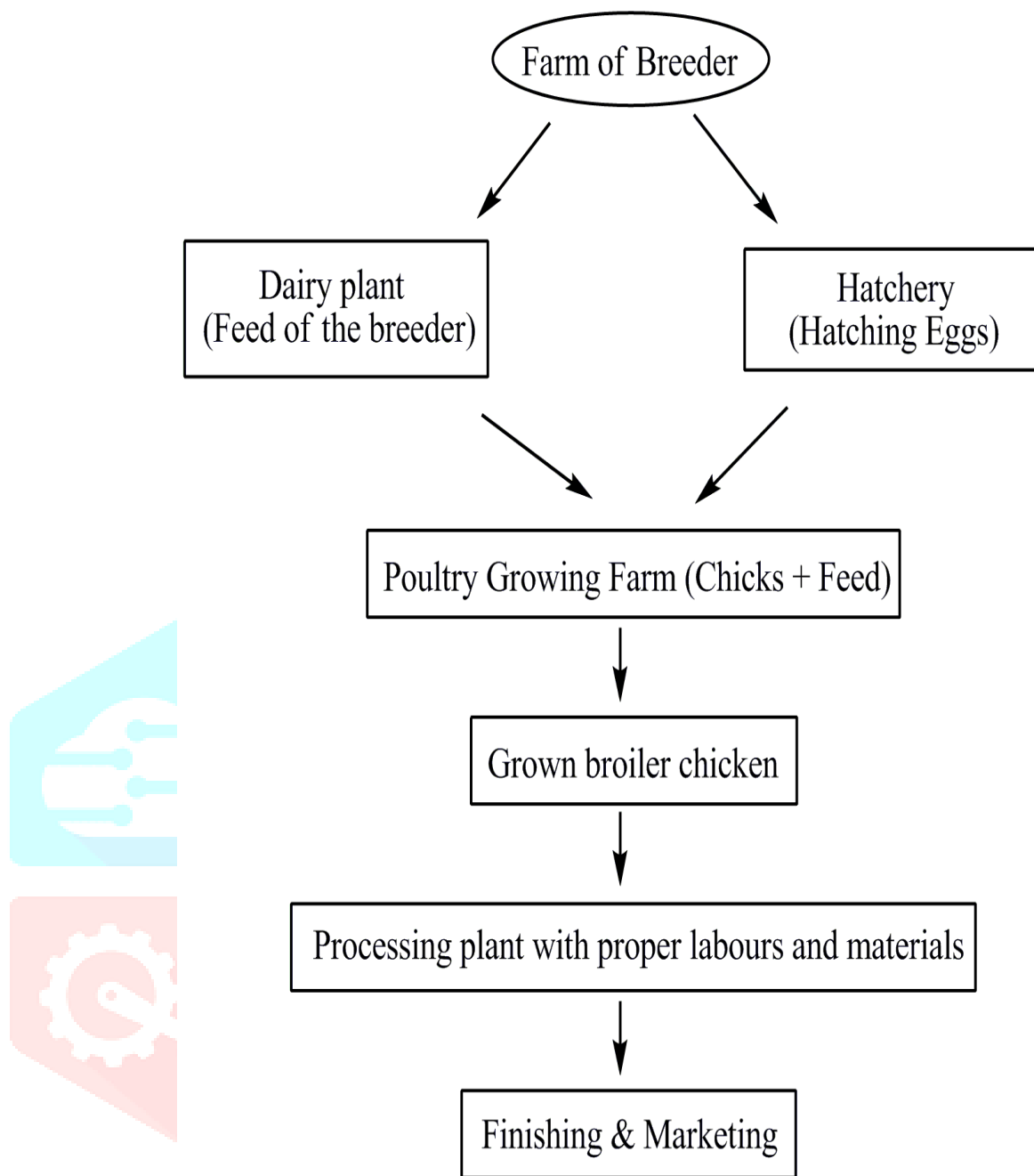
FIGURE 2: FLOW DIAGRAM BETWEEN THE COMPONENTS OF VERTICALLY INTEGRATED POULTRY COMPANY [27]:

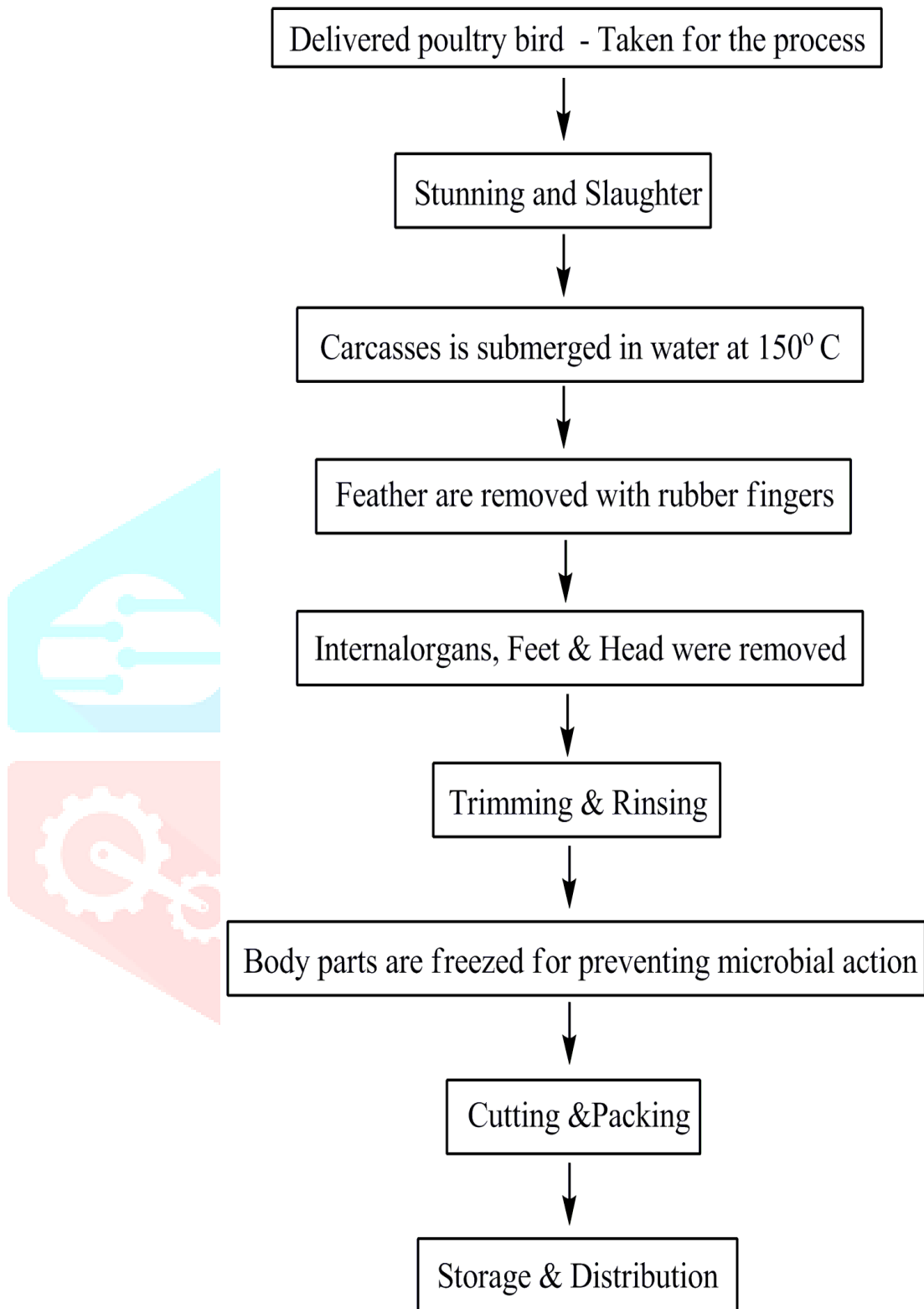
FIGURE 3: FLOWCHART FOR POULTRY MEAT PROCESSING [28]:

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S.NO	BREED TYPE	NATIVE
1	Ankaleshwar	Gujarat
2	Aseel	Andhra Pradesh, Orissa and Chattisgarh
3	Busra	Gujarat and Maharashtra
4	Chittagong	Meghalaya and Tripura
5	Danki	Andhra Pradesh
6	Daothigir	Assam
7	Ghagus	Andhra Pradesh and Karnataka
8	Harringhata Black	West Bengal
9	Kadakhnath	Madhya Pradesh
10	Kalasthi	Andhra Pradesh
11	Kashmir Favorolla	Jammu and Kashmir
12	Miri	Assam
13	Nicobari	Andaman & Nicobar
14	Punjab Brown	Punjab and Haryana
15	Tellichery	Kerala
16	Mewari	Rajasthan

TABLE 2: MAJOR GRAINS ARE USED AS POULTRY FEED AND THEIR COMPOSITIONS

S.NO	TYPES OF GRAINS	BOTANICAL NAME	STARCH	TDN (TOTAL DIGESTIBLE NUTRIENT)	OIL	PROTEIN	CRUDE FIBRE	RUDE FIBRE	ETHER EXTRACT	ASH	REFERENCE
1	Maize	Zea mays	70%	85-90%	4%	8-12%	-	-	-	39.0 %	[20,47]
2	Sorghum	Sorghum bicolor	65%	80-85%	2-3%	8-12%	2.70%	-	2.50%	1.20 %	[20,48]
3	Wheat	Triticum aestivum	-	75-80%	-	10.23 % - 24.53 %	8-14%	-	-	1.00 %	[20,49]
4	Barley	Hordeum vulgare	-	78-80%	-	-	11-16%	-	-	4.03 %	[20,50]
5	Oat	Avena sativa	-	70-73%	-	-	8-12%	-	-	2 ±0.00 %	[20,51]
6	Rice	Oryza sativa	-	78- 82%	-	20-30%	8-10%	9%	1.9%	6.5%	[20,52]
7	Rye	Secale cereal	-	75- 80%	-	8-14%	-	-	-	-	[20]

TABLE 3: REQUIREMENTS FOR CHICKEN FEEDS (on dry matter basis) [16]

S.N O	CONTENTS	BROILER STARTER FEED	BROIL ER FINISH ER FEED	CHICK FEED	GROWI NG CHICKE N FEED	LAYING CHICKEN FEED	BREED ER LAYER FEED
1	Crude Fibre, percent by mass, Max	6	6	7	8	8	8
2	Metabolizab le energy (Kcal/kg), Min.	2800	2900	2600	2500	2600	2600
3	Methionine, percent by mass, Min	0.50	0.35	0.3	0.25	0.30	0.30
4	Crude protein (N X 6.25) percent by mass, Min	23	20	20	16	18	18
5	Calorie/ Protein Ratio	122	145	130	156	144	144

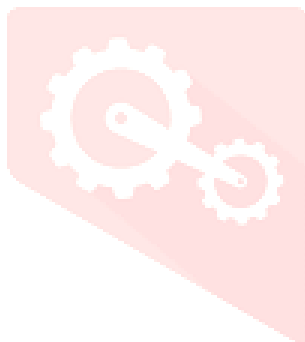


TABLE 4: THE DIFFERENCE BETWEEN FRESH AND FROZEN CHICKEN MEAT [18,19,20]

S.NO	FRESH CHICKEN	FROZEN CHICKEN
1	Fresh chicken meat contains no changes in color and flavor	Frozen chicken meat consists of changes in color and flavor
2	It cannot maintain sensory qualities and not able to control microbial growth for long period of time	It can maintain sensory qualities and control microbial growth for long period of time
3	The transporting of the fresh meat is financially high	Costs will be reduced by transporting in frozen state
4	It can be used directly	It is used after the process of thawing
5	It is healthy	It is slightly unhealthy
6	The fresh chicken should kept in the refrigerator not more than 2 days	In the freezer, frozen chicken can be kept for several months at -18 to -21°C
7	The shelf life is low due to high rate of microbial growth	The shelf life is high

TABLE 5: POULTRY AND EGG PRODUCTION BY DEVELOPED AND DEVELOPING COUNTRIES [21,22,23]

S.NO	CONTENT	POULTRY MEAT (IN MILLION METRIC TONNES)	EGG (NO. OF PRODUCED) EGGS
1	Developed country (US)	20.4	31 (million metric tonnes)
2	Developing country (CHINA)	14.7	596 (billion)

TABLE 6: PER CAPITA CONSUMPTION OF POULTRY IN POUNDS [24, 25]

S.NO	YEAR	VARIETY OF BREED			
		TOTAL RED MEAT	BROILER	OTHER CHICKEN	TURKEY
1	2016	106.9	89.8	1.2	91.0
2	2017	108.2	90.8	1.3	92.1
3	2018	109.2	92.1	1.4	93.5
4	2019	111.9	95.1	1.4	96.5
5	2020	111.3	95.8	1.4	97.2
6	2021	111.5	96.6	1.5	98.1
7	2022	111.3	97.7	1.6	99.3



TABLE 7: COMMON POULTRY DISEASES

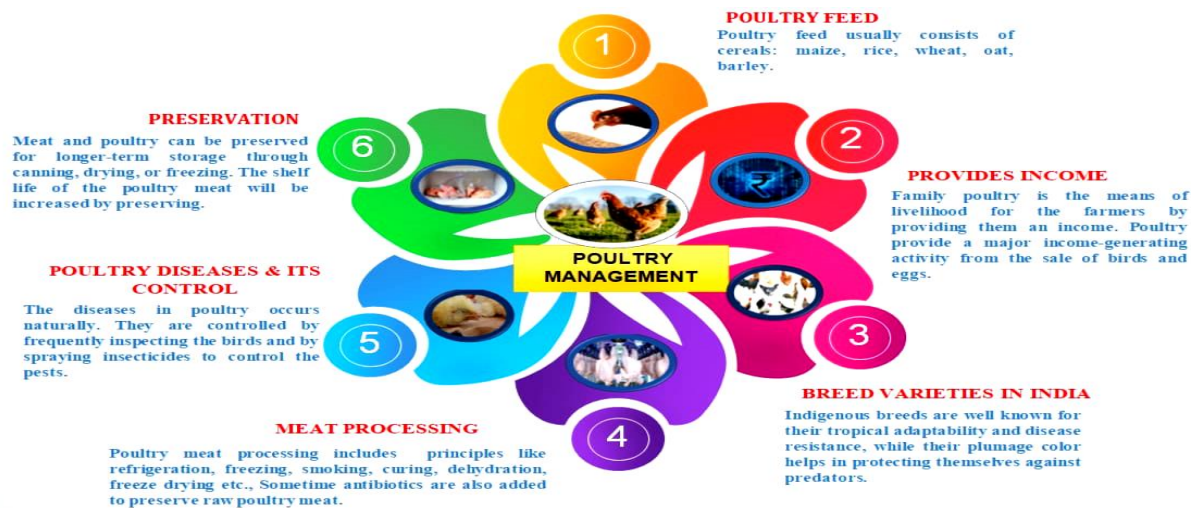
S.NO	DISEASES	SYMPTOMS	REMARKS IN HUMANS	REFERENCE
1	Blackhead diseases	Dropping wings, affects younger ones easily and dies within few days	No thread and does not affect humans	[18]
2	Coccidiosis	Dehydration, blood loss, impaired skin pigmentation	-	[21]
3	Infectious Bronchitis	Respiratory signs, reduced weight gain, reduced feed efficiency	No human significance	[22]
4	Clostridium perfringens	Grows under the PH condition between 6.0 to 7.0	Bacterial food borne illness by consuming the contaminated poultry products	[23]
5	Bacterial pathogens	Infection	Food borne disease	[24]
6	New castle disease virus	Depression, ruffled feathers, open mouth breathing, hyperthermia, anorexia, listlessness, hypothermia before death	-	[25]
7	Rotavirus	Diarrhoea	Cause enteric disease	[26]

TABLE 8: PARASITES TRANSMISSION [35]

S.NO	NAME OF THE PARASITES	BIOLOGICAL NAME	TYPES OF POULTRY	CAUSES	CONTROL MEASURES
1	Northern Fowl Mites	Ornithonyssus sylviarum	caged layer and breeder flocks	feather discoloration around the vent where their feeding results in skin inflammation, irritation, scabbing, and anemia	Sulfur at high rates eliminated mites from birds for 3 months, Nontraditional treatments have been tested for mite suppression, but results show only temporary alleviation of mite numbers.
2	Larval chiggers	Neoschoengastia Americana	Turkeys	skin inflammation and lesion formation.	prevent bird infestation, Chigger-damaged areas must be removed at slaughter,, or birds must be kept off chigger-infested ranges during chigger season
3	Fleas	Echidnophaga gallinacean	Chickens, Turkeys	stunted growth, reduced feed conversion efficiency, and other adverse effects.	Lice differ in their predilection sites and they are treated based on the types of the louse species.
4	chicken body louse	Menacanthus stramineus	Chickens	skin irritation and injury that may result in scabbing.	Using pest control products
5	Lesser Mealworms (or)	Alphitobius diaperinus	Broiler	Both larval and adult stages of	pesticides available for

	Darkling Beetles			these omnivorous beetles feed on dead and dying birds, spilled feed, and excreta, picking up and perpetuating pathogens	darkling beetle suppression in poultry houses
6	Bed Bugs	Haematosiphon inodorus	chickens and other poultry	cause severe effects bird health and profitability	Pesticides

GRAPHICAL ABSTRACT:



HIGHLIGHTS:

- Family poultry is the means of livelihood for the farmers by providing them an income. Poultry provide a major income-generating activity from the sale of birds and eggs.
- Poultry feed usually consists of cereals: maize, rice, wheat, oat, barley.
- The diseases in poultry occurs naturally. They are controlled by frequently inspecting the birds and by spraying insecticides to control the pests.
- Poultry meat processing includes principles like refrigeration, freezing, smoking, dehydration, freeze drying etc., Sometime antibiotics are also added to preserve raw poultry meat.
- Meat and poultry can be preserved for longer-term storage through canning, drying, or freezing. The shelf life of the poultry meat will be enhanced by preserving.