2023

INTERNSHIP REPORT

THE CHICKEN SPECIALIST

Chicken Processing Plant

By

Sabirs' Group of Companies

Submitted by:

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49128

B.Sc. (Hons.) Food Science and Technology

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Submitted to:

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In the Name of Almighty Allah, The
Most Gracious, The
Most Beneficent, The Most Merciful.

"It is He Who sendenth down rain from the skies: with it We produce vegetation of all kinds: from some We produce green (crops) out of which we produce grain heaped up (at

harvest); out of the date-palm and it sheaths

(or spathes) (come clusters of dates hanging low and near: and (then(there are) gardens of grapes and olives and pomegranates each

similar (in kind) yet different (in variety): when they begin to bear fruit and the happiness

thereof. Behold! in these things there are signs for people who believe."

AL QURAN *ANAAM-99*

AKNOWLEDGEMENT

I am very thankful of **ALLAH ALMIGHTY** who gave me blessing to join this internship job. All praises, knowledge and words are bounded to gratitude the glory of Allah, The only Omnipotent, most compassionate and merciful and The Lord of All beings that exist, Who's the authority, power and absolute source of entire knowledge and comprehension that endowed to mankind. First and foremost, I would like to thank **ALLAH THE ALMIGHTY** for giving me the strength, knowledge, ability, wisdom and opportunity to undertake this research study and to persevere and complete it satisfactorily. Without His blessings, this achievement would not have been possible.

A special prayers to **PROPHET MUHAMMAD (PEACE BE UPON HIM)** from the deepest core of my heart, the last messenger of ALLAH is the best creation, a role model on how to be of exemplary character of love, compassion, wisdom , kindness, mercy and forever a source of guidance and knowledge to the whole mankind.

This was fantastic opportunity and chance for learning and professional development as internee. I am lucky to have internship in **SABROSO**, which is Pakistan's leading poultry processing Company. Which is also known as The Chicken Specialist.

I'm very grateful to **Mr. Khalid Javed** (Senior Quality Assurance Manager), **Mr. Humayun Nasrullah** (Quality Assurance Officer), under their distinctive supervision, positive attitude, keen interest, devotion and admiration I did my course work. I am heartily thankful to them for their dynamic efforts, inexhaustible patience and fruitful suggestions throughout the course of work.

Special thanks to **Dr. Muhammad Afzaal** (Internal Supervisor, GCUF Faisalabad Pakistan) for their guidance, assistance, ideas, collaboration, and cooperation during the internship program.

I intimate my deep sense of gratitude and appreciation to my family, particularly to my mother whose prayers, love, affection and association play a morally distinguish contribution to complete my efforts. I pay thanks to my friends and Supervisors they provide me correct information which I asked them during the internship. I pray for my parents; they have provided me chance to get this opportunity.

Khurram Shahzad

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INTRODUCTION:

Sabirs' Poultry processing unit was established in May, 2017, 15 KM off Sheikhupura-Faisalabad Road, Barianwala Drain, Kharianwala, District Sheikhupura, Pakistan. The Sabroso logo compromises of two elements; the logo symbol & the logo type. The logo symbol is a powerful shape depicting the seal of surety and confidence that Sabroso promises and delivers in all of its products.

SABROSO is a Spanish word which literally means" TASTY and DELICIOUS ".

This industry is producing nearly 173 different products including many types of piece-cuts of different specifications as per requirement by the customers, and many more other products are the made, marinated that are *ready to cook & fully cooked products* prepared in of further foods processing department. And this industry is continuously working on new products development as well.

The story of Sabroso is a story of love and commitment to quality and health. Sabroso believe that all the people and loved ones deserve hygienic and wholesome chicken at the most affordable rates. Sabroso are committed to bring the top-notch protein enriched products, which is in compliance with internationally recognized and recommended health and well-being standards.

In Sabirs' poultry processing unit, under strict *Sharia* compliance, it is hand slaughtered with Takbeer. With the help of advance technology, it's thoroughly cleaned and hygienically packed. To ensure product freshness products are blast frozen at a very low temperature of -35°C and stored in cold storage at -18°C. Sabirs' foods processing plant producing poultry products. Besides that some hatcheries and poultry farms also comes under the ownership of Sabirs' group of companies. Sabirs' foods is the one of the project of the group and a lot of income is being spent over its progress.

About Sabirs' Group (The Parent Organization):

Sabirs' Group is the sparkling name, institutional landmark, inspiration and a symbol of hope on the horizon of Pakistan Poultry industry. The story of Sabirs' is a story of love and commitment to quality and health spanning decades of experience in the poultry industry.

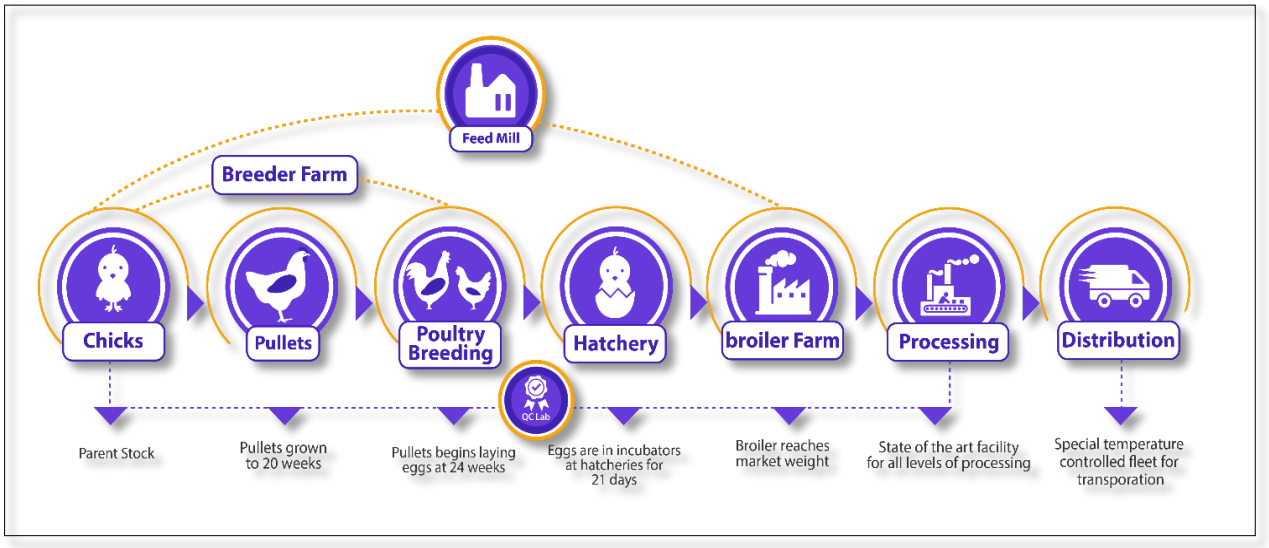
The group carries a history that extends over many decades of experience, expertise, patriotism and commitment to provide better nutrition to the nation. In our region, mal-nutrition is the real challenge and its percentage especially among children is really alarming; this distressing situation

led to the establishment of Sabirs' Group with the devotion to ensure availability and affordability of poultry and poultry products for the people of Pakistan, as they are a healthy source of proteins. Once Sabirs' Group has successfully made its mark and impact in the B2B market of poultry industry, the group has laid the foundation of its state-of-art poultry processing plant to further high quality and safe chicken for all households.

After a progressing in decades of poultry business Sabirs' group developed a chain of their own vertically integrated flow to feed upon their own needs to make this organization more fluent for growth.

VERTICAL INTEGRATION PROCESS:

Capitalizing on decades of poultry expertise and commitment to food safety, Sabirs' group have successfully established a vertically integrated poultry production process by managing & controlling all stages of production under strict compliance of our state-of-the-art quality management system.



1. Breeder Farms:

Sabirs' Group owns a number of competently managed state of the art breeding farms all across the Pakistan where parent stock, grows naturally in the healthiest environment. Specialized nutritionists, health and housing professionals supervise these breeding farms. All farms have automated ventilation, efficient cooling, heating, drinking and feeding equipment. A bio-security

program is also strictly implemented to minimize risk of diseases among chicks and the result is an excellent quality disease free hatching eggs for broiler day old chicks.

Best quality hatch able eggs are fumigated and cooled down inside air conditioned and humidified egg storage rooms to be dispatched in disinfected and environmentally controlled vehicles, to our hatcheries across Pakistan.

2. Hatchery:

Sabirs' hatcheries are envisioned to be one of the largest broiler hatcheries in the country, having the most modern cooling, heating & humidification systems to provide unvarying and constant hatchery environment. Healthy fertilized eggs are selected carefully and then placed in clean, disinfected incubators where after 18 days they are shifted into hatchers and where after 3 days chicks begin to hatch.

Hatched chicks are then graded with sophisticated grading procedure; a team of vets monitor the day old chicks while handling, reconstituting and administering vaccines. Chicks are then packed in boxes and dispatched to broiler farms in exclusively designed vehicles to reduce stress and mortality during transportation.

3. Broiler Farms:

Sabirs' group have one of the largest broilers farms in the country in terms of capacity. The chicks in broiler farms eat as per their need and drink fresh and purified water from nipple drinkers. These broiler chicks are given high quality and high nutritious poultry feed. A skillful and seasoned professionals observe & monitor these chicks on regular basis in terms of their health & nutrition and here they grow naturally in clean and well ventilated houses.

4. Feed Mills:

Scientifically formulated feed is produced at own feed mills to ensure balanced diet. Natural grain products such as corn, soybean, canola and sunflower supplemented with multivitamins and minerals are used for the production of feed which undergoes stringent laboratory testing and quality assessments during the production stages.

5. Quality Control Labs:

A quality assurance lab is an integral part of quality production. Sabirs' internationally standard, well equipped quality assurance lab is the major contributor in our production process. It not only monitors the entire integration process but also regulates it to ensure that all chicken and chicken products are full of nutrition and as per international food safety standards. Beside this, all international HSE and Personal Protective Equipment Protocol (PPEP) have also been implemented on plant.

6. Primary Processing: (Primary Products):

Healthy chickens are used to produce finest quality, hygienic and tasteful chicken which are slaughtered HALAL by hand as per strict Sharia Compliance. Chicken are then washed inside out hygienically and then they are processed in an automated manner through most modern equipment. A strict veterinary inspection of all the products is done and experts collect random samples from the processing line.

Chickens are sorted by weight, cut, packed in-accordance with specific requirements and placed in designated containers through the automated lines in the processing hall. They are prepared to ship whole, or packed as bone-in-cuts or premium boneless products. To ensure product freshness products are blast frozen at -40°C for about 6 hours and are subsequently stored at -18°C to keep them fresh and nutritious.

7. Distribution & Outlet:

Disinfected, well sanitized refrigeration trucks are used for the distribution of these packedproducts to make sure unmatched quality control.

CERTIFICATIONS:

Food safety certification is a third-party verification that products, processes or systems in the food supply chain meet accepted food safety standards. It is distinct from other systems of proof of conformity such as supplier declarations, laboratory test reports or inspection body reports. Food safety certification is based on the results of tests, inspections and audits and gives confidence to the consumer because an organization's products and/or system are being thoroughly evaluated against accepted national and international industry standards by a competent third body.

Product certification attests that a food product complies with the safety, fitness for use and/or interchangeability characteristics defined in standards, and in specifications supplementary to standards, where they are requested by the market.

Food safety certification conveys to consumers and the marketplace, as well as to employees and key stakeholders, that a food sector business has successfully met the requirements of a national or internationally recognized best practice approach that ensure the quality and standard of food to community.

Certifications of Sabroso:

There are four different certifications that Sabirs' processing unit have from differentorganization to ensure the safety, standard and consumer satisfaction.

- **PAKISTAN HALAL STANDARD (PS-3733):** Halal food management system requirements for any organization in food chain and/or compliance to organization of Islamic countries' general guidelines on halal food (OIC/SMIIC-1).

- **ISO 9001:2015:** specifies requirements for a quality management system when an organization:
    - Needs to demonstrate its ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements, and

- Aims to enhance customer satisfaction through the effective application of the system, including processes for improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements.

❖ **HACCP:** is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product.

HACCP Principles:

1. Conduct a Hazard Analysis.
2. Identify Critical Control Points.
3. Set Critical Limits.
4. Establish Monitoring procedures
5. Establish Corrective Actions.
6. Establish Record Keeping procedures.
7. Verification that HACCP works

❖ **FSSC 22000**: has been developed in respond to customer demands for a recognizable standard against which a food safety management system can be audited and certified. FSSC 22000 was given Global Recognition by the GFSI (Global Food Safety Initiative), as well as other food safety schemes such as BRC or IFS.

BUREAU VERITAS
Certification

SABIR'S POULTRY (PVT) LIMITED
1.6 KM KHARIANWALA BARIANWALA ROAD, KHARIANWALA,
SHEIKHUPURA - PAKISTAN

Bureau Veritas Certification Holding SAS –UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 9001: 2015

Scope of certification

SLAUGHTERING AND PROCESSING OF BROILERS CHICKEN INTO FROZEN / CHILLED WHOLE CHICKEN, PORTIONS, BONELESS MEAT AND EDIBLE INTERNAL ORGANS, AND FURTHER PROCESSING OF READY TO EAT AND READY TO COOK PRODUCTS

Original cycle start date: **05th November 2017**

Certification Audit date: **16th August 2017**

Certification cycle start date: **05th November 2017**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **04th November 2019**

Certificate No. PAK17.1748-U Version : 01 Revision date: **27-11-2018**

Signed on behalf of BVCH SAS UK Branch

Certification body address:5th Floor, 66 Prescot Street, LondonE1 8HG, United Kingdom
Local office: H. NO. 177 Block 7/8, Karachi Memon Cooperative Housing Society, Karachi, Pakistan
Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.
To check this certificate validity please call: **+92 21 111 786 013**

1/1

HALAL حلال
BUREAU VERITAS
Certification

Certification
Awarded to

SABIRS' POULTRY (Pvt.) Ltd.

FACTORY: 1.6 km kharianwala barianwala road, Kharianwala, Sheikhupura. Pakistan

Shariah Board of Bureau Veritas Certification Pakistan certifies that the HALAL Management System of the above organization for the following products has been audited and found in accordance with the below mentioned requirements

1. **Pakistan Standard for Halal Food Management System (PS 3733: 2016)**
2. **Halal Certification According to Islamic Rules**

Scope:	"Slaughtering and processing of broilers into frozen / chilled whole chicken, portions, boneless meat and edible internal organs, and further processing of ready to eat and ready to cook products".
Category:	C – Processing-1 (Perishable Animal Products)

Further Information:

Brand:	**Trade Mark:**
SABROSO	Sabirs' Poultry (Pvt.) Ltd.

Original approval date: **07-September-2017**

Subject to the continual satisfactory operation of the organization's Halal Food Management System, this Certificate is valid from: **07-September-2017** *Valid until:* **06-September-2019**

To check this certificate validity plesses call: **+92 21 111 786 013.**
Further clarifications regarding the scope of this certificate and the applicability of the Halal Food Management System requirements may be obtained by consulting the organization.

Certificate Number: H-17.0005/H-P *Date:18-10-2018*

Mufti Muhammad Qasim
Shariah Advisor/Dy. Manager
Halal Food Certification

Tariq Qamar
Dy. CEO Northern Zone

M. S. Saqib
Manager Technical (SCS)

MANAGING OFFICE ADDRESS: Bureau Veritas Certification Pakistan
Karachi: House no. 177 Block 7/8, Karachi Memon Cooperative Housing Society
Lahore: 334-A/1, Block College Road, Johar Town.

BUREAU VERITAS
Certification

Certificate

awarded to

Sabirs' Poultry

Plant: 1.6 km kharianwala barianwala road, kharianwala, Sheikhupura,Pakistan

Sabirs' Poultry has been assessed and certified as meeting the requirements of HACCP Codex Alimentarius Hazard Analysis and Critical Control Point (HACCP) system and guidelines for its application.
Annex to CAC/RCP-1-1969, Rev.4 (2003)

Scope *of Supply*

"Slaughtering and processing of broilers into frozen / chilled whole chicken, portions, boneless meat and edible internal organs, with or without marination".

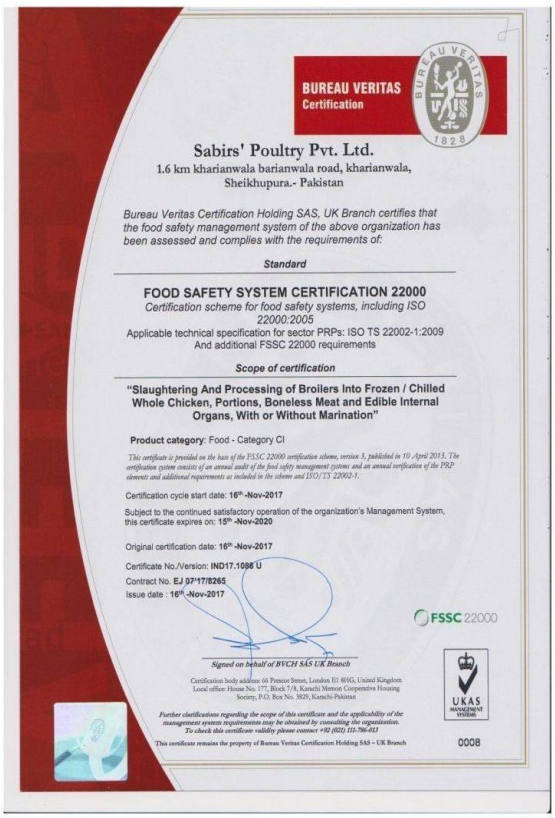
Original Approved Date: 14.09.2017 *Validity date: 13.09.2020*

To check this certificate validity please call: +92 21 111 786 013, after monitoring the performance of the organization's management system against the mentioned requirements in forthcoming Audits, the certificate validity will be renewed every year subject to maximum 36 months from the date of assessment.

Certificate No: Pak17.0005/H-P *Date: 18.09.2017*

Mohammad Shahab Saqib

MANAGING OFFICE ADDRESS: H.NO. 177 Block 7/8, Karachi Memon Cooperative Housing Society, Karachi, Pakistan



BUREAU VERITAS
Certification

Sabirs' Poultry Pvt. Ltd.
1.6 km kharianwala barianwala road, kharianwala,
Sheikhupura.- Pakistan

Bureau Veritas Certification Holding SAS, UK Branch certifies that the food safety management system of the above organization has been assessed and complies with the requirements of:

Standard

FOOD SAFETY SYSTEM CERTIFICATION 22000
Certification scheme for food safety systems, including ISO 22000:2005
Applicable technical specification for sector PRPs: ISO TS 22002-1:2009
And additional FSSC 22000 requirements

Scope of certification

"Slaughtering And Processing of Broilers Into Frozen / Chilled Whole Chicken, Portions, Boneless Meat and Edible Internal Organs, With or Without Marination"

Product category: Food - Category CI

This certificate is provided on the basis of the FSSC 22000 certification scheme, version 3, published in 10 April 2015. The certification system consists of an annual audit of the food safety management systems and an annual verification of the PRP elements and additional requirements as included in the scheme and ISO/TS 22002-1.

Certification cycle start date: **16th -Nov-2017**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **15th -Nov-2020**

Original certification date: **16th -Nov-2017**

Certificate No./Version: **IND17.1098 U**

Contract No. **EJ 97178265**

Issue date : **16th -Nov-2017**

FSSC 22000

Signed on behalf of BVCH SAS UK Branch

Certification body address: 66 Prescot Street, London E1 8HG, United Kingdom
Local office: House No. 177, Block 7/8, Karachi Memon Cooperative Housing Society, P.O. Box No. 3829, Karachi-Pakistan

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization.
To check this certificate validity please connect +92 (021) 111-786-013

This certificate remains the property of Bureau Veritas Certification Holding SAS – UK Branch

UKAS MANAGEMENT SYSTEMS
0008

IMPLEMENTATION AREAS OF CERTIFICATIONS:

In Sabroso, critical and halal control point and operational pre-requisite program (CCP, HCP, and OPRP) are implemented in following areas' to ensure the quality and halal processing of bird.

1. Table for CCP Implementation

SR. #	Area of Implementation (CCP)	Control
CCP-1	Spin Chiller	For Reduction Of Microbial Load • Incoming Water Temp. < 1.8 °C • Exit Carcass Temp. ≤ 8.5 °C • Chlorine Conc. 22-45 ppm
CCP-2	Metal Detector	Detection Of Metal Particle • Ferrous (2.5 Mm) • Non-Ferrous (3.0 Mm) • Stainless Steel (4.0 Mm)
CCP-3	Chilling Room	Maintain Temp. Range 0-4 °C

2. Table for HCP Implementation

SR. #	Area of Implementation (HCP)	Control
HCP-01	Ante Mortem Inspection	Physical Segregation of Sick/Dead Birds
HCP -02	Slaughtering and bleeding	▪ Trained Slaughterers ▪ Bleeding Time >3 Min

HCP -03	Slaughtering Inspection	▪ Inspection Of Halal Slaughtering In Each Bird ▪ Properly Cut - Trachea, Esophagus, Jugular Vein & Carotid Artery
HCP -04	Scalding	▪ Scalding Temp 54-57 °C ▪ Scalding Time 90 Sec. ▪ (Scalder + typhon shower)= (1:20 - 2:30) minutes
HCP -05	Spices and Salt (in FP Area)	Halal Certification, Guarantee from supplier Supplier auditing/ QA inspection
HCP -06	Packing of products	Inspection For Najis/Food Grade Material

3. Table for OPRPs Implementation

SR. #	Area of Implementation (OPRP)	Control
OPRP-1	Ante Mortem Inspection	Separation Of Sick/Diseased Bird
OPRP-2	Post Mortem Inspection	Segregation Of Sick Carcasses And Rejected Body Parts
OPRP-3	Packing	Final Product Temp • Bone In Product : <12 • Boneless Products : <13
OPRP-4	Cold Storage	Frozen Product Temp. ≤ -18 °C

Primary Processing:

Primary processing is defined as processing of poultry from its reception up to storage involving the operations like live bird receiving, holding, hanging, slaughtering, scalding, de-feathering, evisceration, cutting and portioning, packing, freezing, and storage of the poultry. Primaryprocessing starts when birds are caught at farm and transported to processing plant.

In primary poultry processing, live bird are received and then slaughtered, eviscerated, and cut into different shapes and size according to demand of customer and market. Furthermore, these cuts are packed or sent for further processing to produce different delicious products.

High risk Area:

In high risk area which includes Cut-up Area and freezer and for further processing blast freezer this area is highly risked area in this area desired products are being made according to consumer demand and this area has strict protocols which is mandatory for every worker, supervisor and officer.

Low risk Area:

The backend area where hazard is not directly passed to costumers and risk can be controlled or eliminated completely there. The Backend Area is low risk area. Company SOPs that no worker can work of low risk area in to high risk area or vice versa. Both areas have their special workingand entrance protocols. In this section, live bird receiving area, Slaughtering and Evisceration areais included. Detail information Of These areas are given below.

Breeder Strains:

There are some strains of poultry bird which are used in poultry processing industry which are,

I.	Cobb	VI.	Ross
II.	Stegglis	VII.	Arboracres
III.	Hubchicks	VIII.	Hubbard
IV.	Lohmann	IX.	Pilch
V.	Starbro	X.	Tegel

But in **Sabroso** mostly two breeds are most common which are used to process in poultry.Which are named as:

1. Arboracres
2. Hubbard

1. Holding area:

Holding area is initial part of processing where vehicles arrived from poultry farm. When the vehicles enter in the plant first weighs near main gate on vehicle weighing balance then after weighing it will go to holding area. It is well maintained and ventilated area where birds are kept on controlled temperature under blue lights. Blue lights are used to calm the birds because birds are stressed out after transportation. The holding area consist of

- 13 exhaust fans
- 15 Ceiling fans
- 16 center fans
- 11 cooling pads

There is temperature gauge to check the temperature which should not be more than 25℃. Holding area can stand 10 vehicles in two rows, 5 in each row.

- Humidity in this area is 75%.
- Temperature of this area is maintained at 19℃.
- 1 central cleaning system is present in holding area to ensure the hygienic measures.
- Birds are kept here for short time according to animal welfare standards.

2. Live Bird Receiving Area:

Live bird receiving area is initial part of processing where vehicles arrived from holding area are unloaded and further processed. It is also well maintained and ventilated area where poultry birdsare kept on controlled temperature. 1st of all vehicle is allowed to enter in Live bird receiving area.

Standard temperature at live bird receiving area is less than 25°C. Fogging system (mist) is used in live bird receiving area for maintaining the temperature. Furthermore, 5 cooling pads are also used for cooling live bird receiving area. 5 pipe sources are used for cleaning in live bird receiving area. Blue color pipes are used for cleaning. And Red colored pipes are used as source of water incase of emergency.

Then these crates are unloaded on Typhon conveyor and these crates are passed through electronic DIGI (digital) scale where from gross weight of each crate is measured separately. Floor material of live bird receiving area is of floor chips. And walls have 10 feet tiles.

Live bird receiving area information:

- Exhaust fans
- Air circulation fans
- Cooling pads
- Fogging system
- Windows
- Shackles in live bird receiving and slaughtering area
- Roll conveyors
- LED lights
- blue colored water pipes
- Post mortem table
- Sick bird crate
- Dead bird crate
- Weighing balance for dead/sick birds
- Knife sharpening table
- Standard Temperature of live bird receiving area ≤ 25°C
- Standard temperature of crate washer = 41°C Total time for 01 crate washing = 58 sec.

Fans & Cooling pads in live bird receiving area:

A farm having width of 50ft and height of 9ft and length of 400ft.

- ✓ 6 exhaust fans
- ✓ 12 ceiling fans
- ✓ 5 cooling pads
- ✓ 4 fans hanging on workers where bird is being hanged.

- ✓ 2 air circulation fans
- ✓ 1 at crate washer area and 1 at bird unloading area

Live Bird Receiving Area working Scheme

- Vehicle Arrival
- Unloading of Crates
- Gross weight of Crate
- Hanging on Shackles and Dead Bird removal
- Crate Washer
- Vehicle Washing
- Loading Washed Crates

Allocation of Workers in live Bird Receiving area:

There is following arrangement of workers, which is used in live bird receiving area.

- ➢ 08 workers hang the birds.
- ➢ 04-05 workers are fixed for unloading the crates.
- ➢ 01 worker is fixed for washing conveyor, vehicle and ground surface in live bird receiving area.
- ➢ 02 workers are fixed for reloading.

Crates of Birds:

During transfer of Poultry birds from farm to poultry processing plant, these poultry birds are keptin plastic crates. Each crate has 8.25kg weight. 1 crate consists of 12 birds normally. So, gross weight of 1crate, including (crate + Live Birds) is 29-30kg. And one vehicle consists of 200 cratesof poultry birds. Therefore, there are 2760+ birds per vehicle in winter season. On the other hand, 10 birds are kept in single crate in summer season. Therefore, there are 2200-2400 birds that come in summer season. In special cases i.e. Sultania (out source) vehicle consist of 200 crates and carry 2800 birdsin one vehicle.

Unloading of crates:

There are two methods of unloading of crates.

1. Slide method
2. Steel hook method

There are 200 crates of birds in a single vehicle. During time of unloading crates from the vehicle towards the Conveyor belt, an unloading slide having 48 inches height is used. Top 100 crates are unloaded using this slide and remaining 100 crates are unloaded one by one on conveyor belt. No. of birds in a cage dependsupon weather conditions. By the time of unloading of sultania vehicle top 100 crates are unloaded by slides.Then remaining crates unloaded by steel hook method.

Weighing of Birds:

In this process, the crates on the conveyor belt are allowed to pass through a photo cell which is attached to the computer where the software done the calculation and record of the weight of eachcrate. The crate when reached in front of the cell it is being stopped by sensor to facilitate in weighing...

This software maintains the record of the crates of individual vehicles along with their supplier name. Then the hard copy or print could be produced. And from that record average weight is calculated.

Three types of weighing balances are used for weighing the mass of Birds.

1. Weighing of birds at farm by using Weigh Bridge.
2. Weighing of birds at plant by using Weigh Bridge.
3. Weighing of Crates separately on DIGI (digital) Scale.

Average weight loss during handling and holding of birds per vehicle is 100-150 kg.

Hanging of Birds:

Shackle Conveyer:

- There are 8-9 persons involve for hanging of Live Birds.(Handling)
- The direction of head of Bird is opposite to the person. And light should be dim (blue) at that side because to control the stress of bird.
- No. of Shackles in Shackle Conveyer from Live Bird Area to Slaughterer Area is 1200.

Washing of Crates:

Washing of crates is done at 41°C. Valves are used for hot water. Crates washer: This crate washing is done to remove fecal material attached to crates for the purpose of lowering microbial load from crate to prevent cross contamination and to clean the crates. Steam and hot water is usedfor cleaning in crates washer. 58 sec. are required for a single crate to pass through crate washer and 08 crates can be washed in 01 minute in this crate washer. Hot water is thrown on crates by

passing through nozzles. In this way, all contaminated material is removed from the crates. Then this affected water is passed through rotatory screens.

Trial of live and Dead Birds Count:

No. of birds in a Cage			**Dead Bird Weight**
Vehicle no.	No. of birds in vehicle	No. of birds dead in vehicle	**Vehicle 1: Sultania**
1	2800	22	**NO. of Dead Birds= 22**
2	2800	34	**Gross weight = 5554.34**
3	2800	40	**Empty cage weight= 8.4kg**
4	2160	44	**Net weight of Dead Birds= 48.5kg**
5	2800	44	**Vehicle 2: company owned**
6	2800	27	**NO. of Dead Birds= 55**
7	2160	58	**Gross weight = 3621.14kg**
8	2160	55	**Empty cage weight= 8.25kg**
9	2160	65	**Net weight of Dead Birds= 110 kg**
10	2160	31	

Shackle Conveyors:

It is mostly used in poultry processing plant. Because it is most efficient Conveyor. As comparedto Cone conveyor less time is required for proceeding. 10 minutes per vehicle can be reduced.

Furthermore, worker cost and plant cost can also be reduced by using shackles conveyor.

Ante-Mortem inspection:

In Ante-Mortem inspection Birds are inspected physically. In this step Nasal Discharge is inspected. If dead bird is arrived then it is rejected. Furthermore, Feather color is checked if color of feathers is dark and blackish then bird is assumed to be affected by disease.

Ante-mortem inspection is a professional examination of live birds before slaughtering. Ante mortem inspection is done when birds are received in live bird area.

Process of ante- mortem:

When a batch from supplier is received in live bird area, a trained personal examines that batch.Following things are examined

1. Total number of live bird received from supplier in particular batch.
2. Total number of dead bird in that batch and there percentage.
3. Total number of sick/diseased bird in that batch and there percentage.
4. Total number of runt bird in that batch and their percentage.
   Runt bird are those which remain very small during their growth and do not attain desired weight
5. Under weight and overweight bird are sorted out6 Birds in the weight range of 1.75Kg – 2 Kg are only accepted and if there is shortage of birds the more weight birds are also accepted but with penalty to the supplier which is different for each supplier.
6. Deformities are checked Deformities include fractures and bruises.

After checking each and every point the sick, runt, diseased bird and dead birds are sent torendering and the batch is allowed to unload.

Trials in live bird receiving area:

Some trials that are performed in live bird receiving area

Trial 1: crate unloading time

As mentioned above there are two methods of unloading a vehicle by hook and by slide total time to unload a vehicle is 25-28 minutes from vehicle to Teflon conveyer. Time taken to unload half vehicle by slide is approximately 12-14 minutes and 10-12 minutes by hook. So whole vehicle unloads in 28 minutes approximately.

Trial 2: Crates passes on DIGI scale in one Minute

8 crates passes through digital scale in one minute, due to sensor crate is stopped before digital scale because of complete weighing of one crate.

Trial 3: Time taken by crate from DIGI scale to crate washer

It is observed that from DIGI scale to crate washer it takes approximately 2:58 minutes.

Trial 4: crate washing time

The crate entering from crate washer to out it takes about 1:40 minute.

Trial 5: washing of crates in one minute

8 crates washed in one minute by crate washer in other words we can say that crate washer has capacity of 8 crates to hold inside it. Then after washing, 8 crates goes outside crate washer in one minute.

Trial 6: Shackles counting:

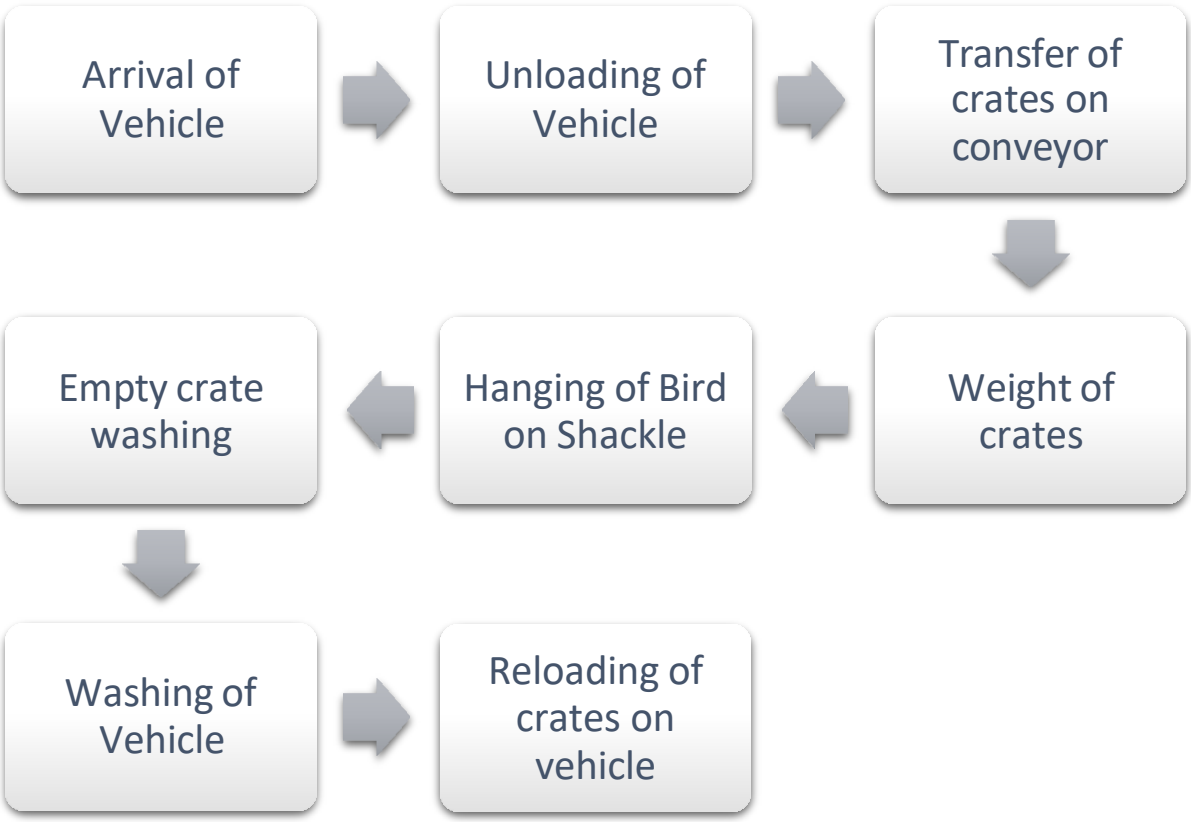
At 01 speed of potentiometer speed of shackles = 11.2 shackles/min.

At 9.5 speed of potentiometer speed of shackles = 105/106 shackles/min.

At 01 speed of potentiometer speed of shackles = 672 shackles/hour.

At 9.5 speed of potentiometer speed of shackles = 6300 shackles/hour.

Layout of Live Bird Receiving Area:



3. Slaughtering Area:

In slaughtering area, live birds came through shackles are slaughtered by using Halal Method. 05 certified and well trained slaughterers slaughter the birds and 02 inspector inspect the slaughtered birds to insure Halal slaughtering. Then carcass passes through bleeding trough.

Slaughtering Area working structure:

- Slaughtering
- Slaughtering inspection
- Bleeding trough
- vein inspection
- Typhoon Shower
- Scalder 1
- Scalder 2
- De-feathering
- head remover
- feather inspection
- bird counter
- shank cutter
- shank unloader
- Shanks Scalding
- Shanks De-skinning

Halal Slaughtering Requirements & method:

- The animal to be slaughtered must be Halal.
- The animal must be alive at the time of slaughter.
- Head of bird is slaughtered using halal methods should be aligned withthe Kiblah.
- The animal must be slaughtered by the use of a sharp knife.
- Slaughtering must be done by an adult Muslim.
- Blood must be drained from the veins **Bleeding Trough:**

In bleeding trough, carcass passes with shackles. And 3 min. are required to pass the shackles frombleeding trough. This blood is collected and sent from rendering by using vacuum pressureinthepipes.

When the slaughtered bird is Halal?

In slaughtering, Halal method is used to meet the customer requirements. 4 veins should be cut in Halal method of slaughtering.

1. Carotid vein
2. Jugular vein
3. Trachea
4. Esophagus

If 3 veins are cut and 1 vein is remained then chicken of this bird will be declared as Makrooh. On the other hand, If 2 veins cut and 2 veins are remained then this meat will be declared as Haram after death. If before death of animal 2 veins cut and 2 veins remained then we can cut remainingveins before death and animal will be considered Halal for consumption.

Bleeding Trough:

Bleeding is done in bleeding trough after slaughtering. Chicken hang on shackles travel throughoutthe trough about 2:59 minutes or more.

Typhon shower:

In typhoon shower, hot water is used.

Scalder 1:

Then carcass is passed through scalder where carcass is dipped in hot water then feathers becomesoft. These feathers can be removed easily. The temperature of Scalder should be 52°C.

Scalder 2:

Then carcass is passed through scalder where carcass is dipped in hot water then feathers becomesoft. These feathers can be removed easily. The temperature of Scalder should be 57°C.

De-Feathering:

After scalding, carcasses are passed through De-Feathering instrument. Where all feathers fromthe skin are removed by using rubber fingers. There are 2016 fingers attached on 336 pullies in De- Feathering instrument. These fingers move in anti- clockwise motion and this instrument isoperated by using 30 motors.

Head puller:

In head puller, heads from all birds are removed. When heads are sucked in the head puller andshackles move forward then head is removed due to force. These heads are sent for rendering.

Bird Count Sensor:

Then these carcasses are passed through the sensor where these slaughtered birds are counted.

Shanks Cutter:

After head pulling and removing pin feathers, the shackles move toward the shank cutter. A sharp rotating blade cut the shanks on hock joint. Then carcass is sent in Evisceration area. And shanksare sent for scalding.

Shanks Scalder:

In shanks scalder, these shanks are passed through hot water and skin of shanks become soft. Thetemperature of shanks scalder is 71°C **Shanks De-skinner:**

After passing through shanks scalder, these shanks pass through Shanks De-skinner. Where theseshanks are deskinned by using fingers. There are 135 fingers in Shanks De-skinner. These rotatingfingers remove the skin from shanks and these shanks are then sent for chilling.

Determination of efficiency of all machines that are using in Slaughtering Area:

Sr. No	Sample size	Instruments	Efficiency
01	100	Head Puller	98%
02	100	De-feathering	95%
03	100	Scalding	92%

Workers in slaughtering area:

Total 15 workers are in slaughtering area one is line leader other 14 are as

- 6-7 workers at slaughtering

- 2 workers at slaughtering inspection
- 1 worker at supervision of halal slaughtering
- 2 workers at Feather inspection
- 2 workers for cleaning

Trials in slaughtering area:

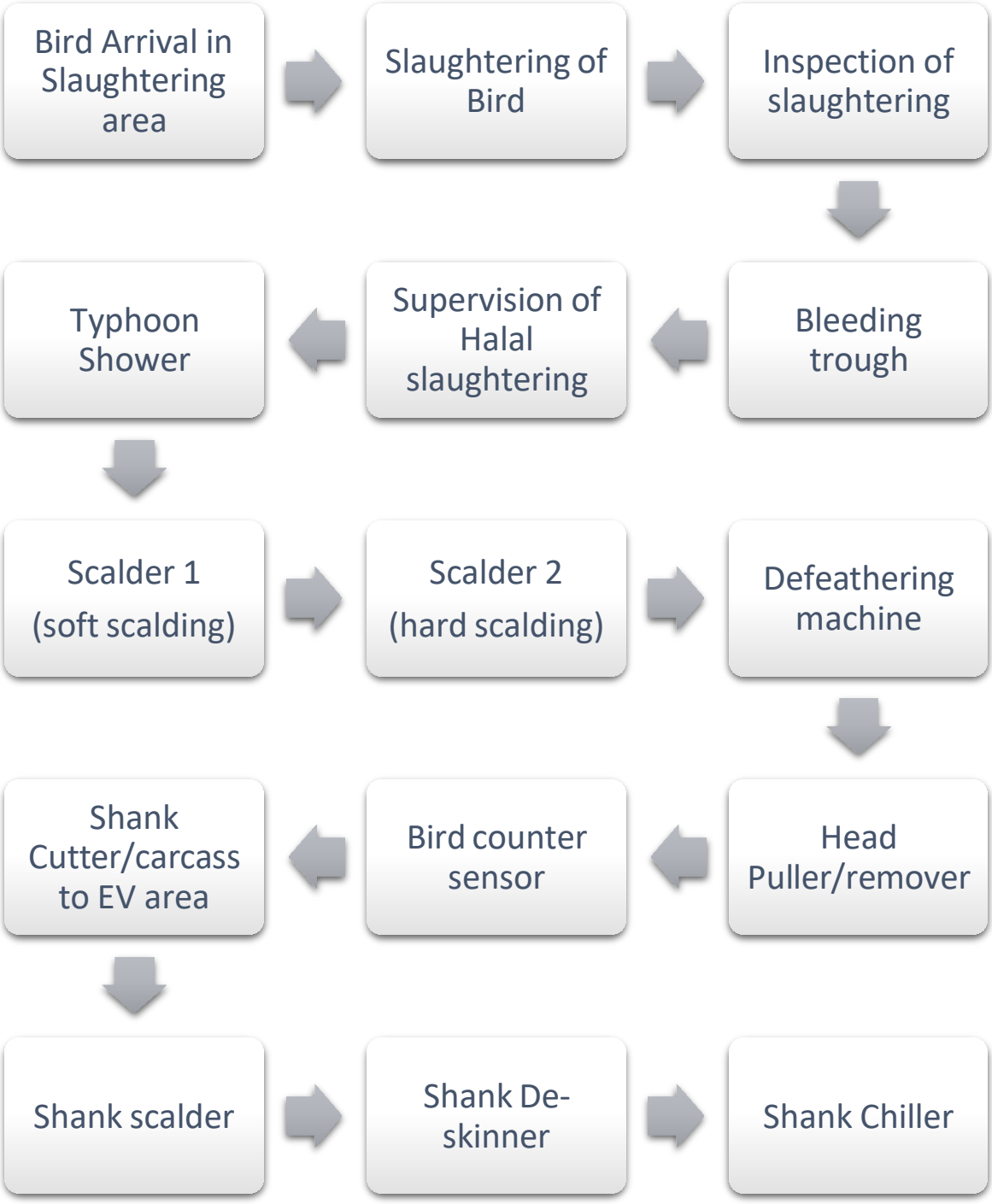
Time trials in slaughtering area.

From bird hanging to slaughter	1 minute
Bleeding time in slaughtering trough	3 minutes
Time in typhone shower	22 seconds
Scalder 1 time	46 seconds
Scalder 2 time	48 seconds
De feathering time	28 seconds
Head remover	2 seconds
Total time taken to shank removing/carcass to EV room	8:30 minutes
Total time taken to shank unloader	9:10 minutes

Sampling in Slaughtering Area

Sample Name	Sample Size	Observed No.
Wing breakage	100	26
Pin feathers	100	9
Improper Slaughtering	100	0

Layout of Slaughtering Area:



4. Evisceration (EV) Area

In Evisceration area, Carcasses are entered after de-feathering and shank cutting. Than these carcasses are hanged on shackles manually. Where vent of carcasses is cut, opened and eviscerated, so that Giblets will be removed. For this process, carcasses are passed through following sequence, Total no. of workers in EV area are 25. There are total 555 shackles in EV Area and 103 shackles are passing in one minute which is slightly lower speed than hanging and slaughtering area shackles.

Bird hanged on shackle

1. Vent cutter.
2. Vent opener.
3. Evisceration machine.
4. inspection
5. Neck cropper.
6. Final inspection. (vacuum inspection)
7. Inside/outside washer.
8. Post mortem inspection

Vent Cutter:

In evisceration area, 1st of all carcasses are passed through Vent cutter. Where rotating spindles are entered in to carcasses and open the abdominal part of carcass by puncturing it. There are 16 spindles in a single Vent cutter. Furthermore, water is also applied in the carcass through spindles.

Vent Opener:

After passing through Vent cutter, these carcasses are next passed through vent opener, where spindles having sharp blades, are used. These spindles are entered into opened abdominal part and give single cut to carcass. So that abdominal part of carcass could be expanded and spindles of evisceration of machine could be passed easily in this hole it helps the evisceration mechanism. There are 12 spindles in a single Vent opener. Furthermore, pressured water is also applied on thespindles

Evisceration (EV) Equipment:

After passing through Vent opener, these carcasses are next passed through evisceration machine, where spindles are entered in this expanded hole and pull out the internal organs of carcass. In thisprocess, liver, gizzard, heart, intestine, gall bladder, spleen and lungs are pulled out from carcass.There are 24 spindles in Evisceration equipment.

After pulling out internal organs from carcass, all these parts including, liver, gizzard, heart, intestine, gall bladder, spleen and lungs are separated manually and disease effected part is removed. Moreover, these parts are trimmed washed and sent for packing. Manual inspection of carcasses is done so that no internal part will remain in the carcass.

Gizzard machine:

In this instrument, Fat and internal layer, which is yellowish in color is removed from gizzardand after washing with tap water, clean gizzard is then sent for packing.

Neck cropper:

In neck cropper, all remaining organs and fat is removed from the neck of the bird and rotating spindles that have sharp edges, are used for this purpose. This rotating spindles are entered insidethe carcass and pass near the neck so that all fat material and all remaining organs are become in contact with spindles and are removed from the carcass. There are 20 spindles in Neck cropper.

Final Inspection machine:

In final inspection, an air vacuum pump is used to remove the missing giblets that have not alreadyremoved and water is sprinkled on carcasses. In final inspection, 16 spindles are used to suck theinternal material of carcasses.

Inside/Outside Washer:

At the end of EV area, carcasses are washed by tap water and this water is passed inside and outside the carcass through spindles and sprinklers respectively. 16 spindles are used to wash thecarcasses.

Post mortem Inspection:

Then postmortem of carcasses is occurred where all disease affected carcasses are segregated andbruised wings & broken wings are trimmed out. If intestine present then it remove from carcass. Furthermore, over scald, poor bled, mechanical cuts, breast bruises, minor scratches, scaly skin

and scab on skin are also inspected here. Then carcasses are passed towards Spin chiller through shackles conveyer.

Time Efficiency within Machine	
Hanging to Vent Cutter	15 seconds
Vent Cutter Time	7 seconds
Vent Opening Time	5 seconds
Evisceration time	10 seconds
Neck Cropping	9seconds
Final Inspection time	7 seconds
Inside Outside Washing time	7 seconds
Bird hanging to Chiller Total Time	**4 Minutes 30 Seconds**

Evisceration Area Information:

- Connecting fans 3
- Conveyer Belts 1
- Gizzard machine 2
- Central Cleaning Units 2
- No. of worker 27

Workers in Evisceration area

- 3 workers at hanging of carcass
- 3 workers at Organ removing
- 2 workers at Gizzard segregation
- 5 workers at Liver/heart segregation
- 5 workers at Liver processing
- 3 workers at Gizzard processing
- 3 workers at heart processing
- 1 at inspection of carcass
- 1 for cleaning of EV Area

Efficiency of different machines working in EV Area

Machine names	Efficiency Observed
Vent Cutter	94%
Vent opener	95%
Evisceration machine	98%

Neck Cropper machine	97%
Final Inspection Machine	96%
Inside/Outside washer	97%
Gizzard machine	100%

Sampling in EV room

Bile contamination Sampling

Bile Contamination Sr. No.	Sample Size	Observed No.
1	100	1
2	100	3
3	100	2
5	100	2
6	100	3
7	100	1
8	100	1
9	100	2
10	100	1

Vent Cutter Missing Sampling:

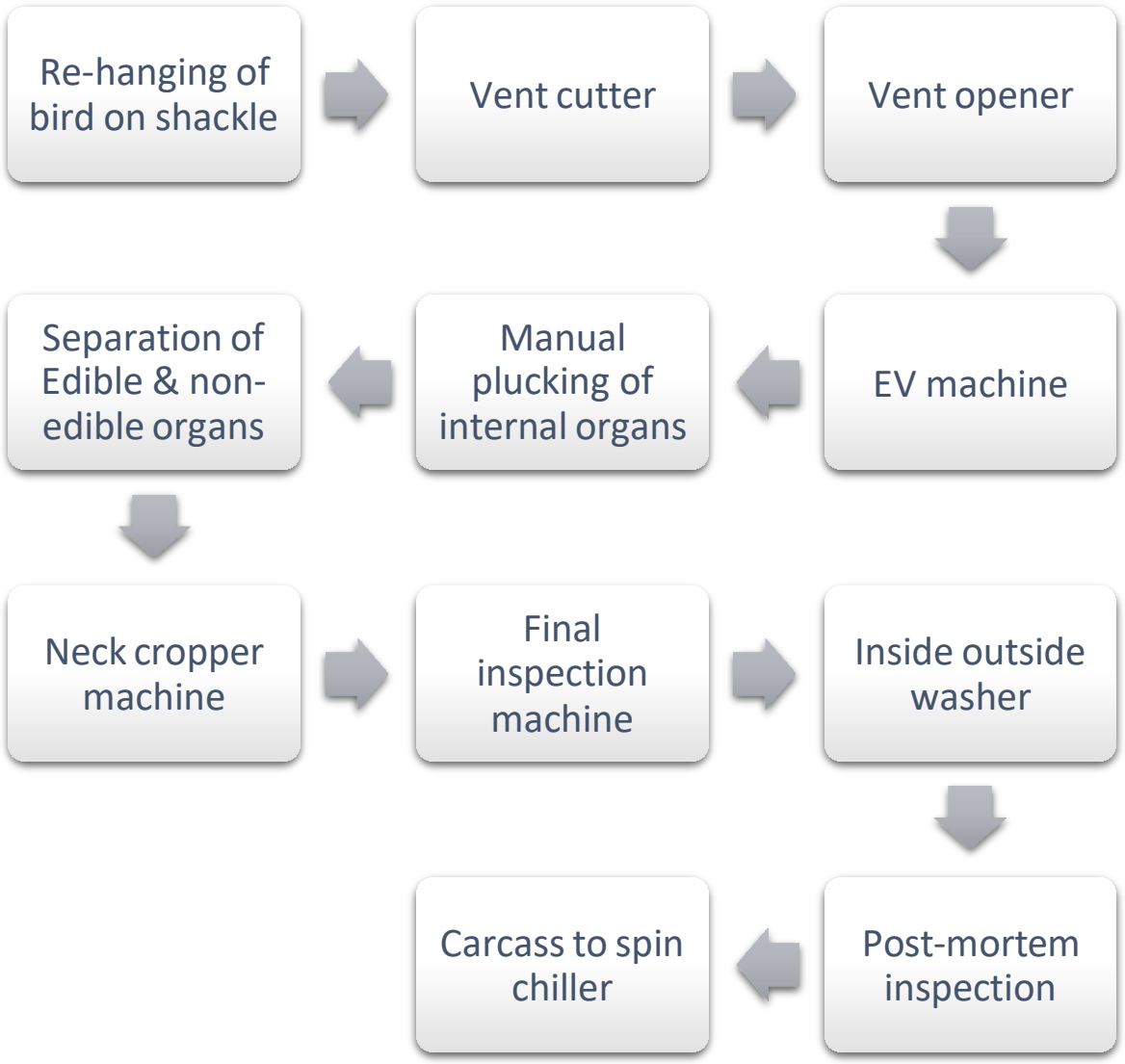
Vent Cutter Sr. No.	Sample Size	Observed No.
1	100	5
2	100	6
3	100	4
4	100	5
5	100	7
6	100	6
7	100	7
8	100	4
9	100	5
10	100	3

Wing Bruises Sampling:

Wing Bruises Sr. No.	Sample Size	Observed No.
1	100	12
2	100	14
3	100	11
4	100	9
5	100	7
6	100	13

7	100	17
8	100	12
9	100	8
10	100	10

Layout of Evisceration Area:



Cut Up Area

High Risk Area:

Cut-up Area is declare as high risk area and this area have different entrance and working protocol from low risk area The cutup area from where hazard can be directly passed to costumer via product .The temperature of this area should be less than 16. This area is dividedin to different lines that are given blow:

- Giblet chiller area
- Shank chiller area
- Spin chiller area
- Transfer line
- Sanitization Units
- Portioning line / KFC line
- Whole skin less chicken line / manual deboning line
- Cone deboning line
- Breast line
- Zinger line
- Wing line
- Meat recovery line
- Skin FFP line
- Manual Deboning Line
- Packing line
- Tagging line
- Printing Area
- Crate washing Area

Giblet chiller area:

This area has two giblet chiller .The incoming water temperature should be less than 1.8°C.Chlorine concentration should be in between 22-45 ppm. Giblet (liver, gizzard, heart) receives from EV area. The crate of these products dip in Giblet chiller for 5-10 min to chill the products. Giblet temperature should be less than 6. After that these products pack into packing bags then weighs. Weight of each pack is 1kg.After packing seal these packet manually through electric sealer. These packets places in crates. Each crate contains Upto 12 packets.

Shank Chiller Area:

Shanks comes from shank de-skinners dips into shank chiller. Temperature of shank chillershould be 11-12°C. There are two parts of shank chiller. Each part has 8 blades which spins slowly. There are one incoming water source and one out going water source. Shanks pack intopackets (5kg and 20 kg packets). Each crate contains 2 packet of 5 kg and one packet of 20kg.

Spin Chiller:

In cut up area, carcasses are entered by shackles. 82-83 shackles are entered in 1 minute and these carcasses are shifted into spin chiller by using automatic system. In spin chiller, thesecarcasses are treated with chlorinated water under controlled temperature. There are two pipesof chlorinated water. The incoming water temperature must be less than 1.8°C and chlorine concentration must be in between 22-45ppm.Moreover two ice flaker are also present in spin chiller to maintain the temperature.

There are two major units of spin chiller. Furthermore, there are 12 blades in them which spin slowly. Total length of spin chiller is 64ft and total subparts are 24. This Spin Chiller has 15000 liter water capacity and 4500-5000 carcasses can be treated in this spin chiller. 1 cycle of spin chiller is completed in 50-55 min. Carcasses are treated with chilled chlorinated water and these carcasses move forward by spinning process. In 2nd part of Spin Chiller, Carcasses are treated with normal water and Ice flakes are also introduced there. Temperature of Carcass should be less than 8.0°C in 2nd part of spinning machine.

Chlorination Test:

For test of chlorination, single chlorination strip is used. In case of Spin Chiller, sample of 20ml water from incoming pipe source is taken in measuring tube and chlorine strip is dipped in sample water. If color of strip is changed from white into Purple color then it indicates that

chlorine is present in water and if color of strip is not changed then it indicates that chlorine is not present in this water.

Change in color depends upon the concentration of chlorine used.

Rehanging of Carcass:

When spin chiller drops carcass onto conveyor, the workers rehang these carcass on to the shackles which pass towards transfer line. After hanging carcass on shackles, workers remove abdominal fat manually. After that these shackles pass through weight sensor.

Transfer line;

There are eight weight sensors of different weight ranges five are working and three are not in working.

Sr. #	Weight Range	Grade
01	321-3210	C
02	1392-3210	B
03	642-1391	B
04	1605-5350	A
05	1338-1387	A
06	642-1123	A
07	1124-1337	A
08	1391-1604	A

After passing from spinning machine, these carcasses are passed to weigh bridge by using drip lines. Overall, 450 shackles are used for conveying these carcasses to weighing Bridge. Wherethese carcasses are segregated according to their mass in 08 different ports. e.g. 850, 900, 1000and 1200g, 1400, 1600.

Sanitization units:

There are many sanitization units in cut up area in which chlorinated water is used to sanitize the hands, equipment and meat separately. In which, different concentrations of chlorine are used according to requirement. Different concentrations of chlorinated water are given following.

Sr. #	Material	Concentration (ppm)
01	Meat	22-45
02	Hands	50
03	Knives	100
04	Floor wall	200

Lines in Cutup Area:

1. Portioning Line:

This line is specially used for cutting of KFC products and also used for some other products which are given below

- KFC 9 piece
- 8 piece Texas
- 8 piece Boaster
- 8 piece KB
- 9 piece CP
- Premium Boti Cut
- Karahi Cut
- 12 Piece Navy

This line has seven cutter machines which are used for cutting these products. Skilled and fullytrained workers are working here. Workers must wearing steel gloves.

KFC 9 piece Standards:

Pieces	Weight	Pieces in one pack
3 Joint wing	75-95	4
Drumstick	85-110	4
Keel	110-145	2
Rib	120-160	4
Thigh	145-190	4
Total:	**2150-2300**	**18**

2. Whole chicken skin less Line/ Manually Deboning Line:

In whole chicken skin less line whole carcasses are processed and packed and sent for storage in blast freezing. These whole skinless chicken is also used for making Karahi Cut, Navy Cut, and Boti Cut. There are two types of whole chicken which are processed in this line. 800, 900, 1000, 1100 and 1200 g packaging is used for whole chicken.

3. Cone Deboning Line:

There are 48 cones in this line which move with 3600 per her speed. Workers manually debone carcass here. 1st workers load carcass on cones then they cut leg and next worker pull it out. 2ndly workers cut breast wings and pull it out. 3rdly workers cut the neck. After this workers remove tender loin and tail. At the end soup bone is removed. Breast wings transfer to the subline where wings are removed from breast. Leg transfer to the zinger line.

4. Breast Line/Easy Grader:

In cutup area, easy grader segregate the pieces of breast on the bases of their mass. there are 08 different portions on which the breast is segregated by calculating their weight, 1st of all pieces of breast are put in the initial part of easy grader one by one. Then these pieces of breast pass through the weighing scale on which breast moves automatically on its belt due to rotation. Sensor count the numbers of breast. Then software gives instruction to portions to carry that pieces according to their weight. The portions of easy grader and their weight capacity is given below.

Portion no.	Weight range	Portion no.	Weight range
Left 01	70-100	Right 02	140-180
Left 03	100-120	Right 04	Not in use
Left 05	Not in use	Right 06	120-140
Left 07	Not in use	Right 08	180-220

After weighing breast transfer to the subline where different breast products are processedwhich are given below

Products Name	Weight (g)
Bone less Breast	100-120
	140-180

	120-140
	180-220
FP Breast Fillet	90-100
FP Hot Shot	10-14
FP Junior Burger Brest	53-63
Butterfly Breast	70-100
	120-135
KFC Burger Breast	53-63
KFC Hot Shot	8-11
KFC Stripe	30-40
KFC Breast Stripe	30-40
Gourmet Stripe	50-60
Gourmet Cubes	14-18
Gourmet Breast	140-180
J&J Breast	120-135
J&J Stripe	33-45
FP Thigh Boti	16-24
Texas Stripe	38-48
Yam Breast	120-140
	100-120
Jumbo Thigh Boti	35-50

5. Zinger Line:

Thigh part come here from manual deboning line and cone deboning line. Zinger are madehere by removing bone from thigh, if bone removes from drumstick whole leg zinger is made. If skin is removed from thigh it forms SBT (skinless boneless thigh) and is removed from whole leg it forms SBL (skinless boneless Leg). Products processed on this line are given below

Products Name	**Weight (g)**
KFC Zinger	85-100
Standard Zinger	85-100

Junior Zinger	75-85
K2G Zinger	65-75
Regular Zinger	100-115
Jumbo Zinger	115-130
SBT (Skinless Boneless Thigh)	70-100
Gourmet SBT	50-60
Jumbo Zinger X	130-140

6. Wing Line:

Three joints wing come from manual deboning and cone deboning line they are separatedinto three parts drumette, niblet and wing tip. Hot wings are processed here. In hot wings 60%drumette and 40% niblet are packed in 2Kg packing.

Products Name	**Weight (g)**	
KFC Hot wings	Drumette Niblet	35-45 28-35
FP Hot wings	Drumette Niblet	35-45 28-35

7. Meat Recovering Line:

Soup bone from manual deboning and cone deboning line comes here for meat recovery. After meat recovery soup bone pack into the packages. Soup bone also used to make Qeema through MDM machine

8. Skin FFP line:

Skin comes here from different lines. After washing skin are cleaned here.

There two grades of skin A and B

- Skin of A grade is free from scratches bruises and infection. And has proper shape. This skin is packed in 02 kg packing and sent for using in further processing.
- Skin of B grade has bruises scratches and misshaped. This skin is packed in 05 kg packing and this skin is not suitable for human consumption.

9. Manual Deboning Line:

On this line workers manually remove skin and cut leg, breast, wings, neck, fillet and tail.

10. Packing Line:

On this line all the products except KFC and portioning line products are packed into half kg, one kg, two kg and 5kg packets. After packing the products, packets are sealed through electric sealers.

11. Tagging Line:

On this line products packs are passed through metal detector. It detects metals (ferrous=2.5mm, nonferrous=3 mm, stainless steel= 4.5). After this tags are put on the packets and placed the crates in chilled storage.

12. Printing Area:

In printing area, Product name its manufacturing date and "Best before" date is printed on the packages that are used for packing the final product in cut up area. These [packages have different dimensions and capacity according to weight. In this packaging polythene bags are use on which corona treatment is used so that ink of video jet printer could stay on this polythene bag. The dimensions of these polythene bags and their capacity is given below.

Sr.#	Dimensions (mm)	Capacity of Bags (kg)
01	170×270	01
02	190×290	01
03	280 × 400 (F.S)	02
04	280×400 (Plain)	02
05	300 × 420	02
06	350 × 460	05
07	450 × 550	05

All the products that are packed in tray packing are chilled at 00 – 04 and its shelf life is 06 days and all the product that are packed in polythene bag are frozen at -18 and their shelf life is 12 months. All products that are produced in further processing area are stored in frozen area.

Storage capacity of Storage area is 2500 ton.

Crate Washing Area:

In this area crates are washed in crate washing machines at 55ºC (standard temp). Chlorine concentration is 100ppm.There are 13-14 crates are washed in one minute.

Quality Control department:

Quality Control (QC) use such procedures that leads to follow the quality parameters and Quality Control also reduces the Hazards by identifying defects in final product and correctingthem.

Trials in Cut up Area:

Trial No1:

Spin Chiller

- Capacity of Water=15000 liter
- Capacity of Birds=4800-5000
- Length of Chiller= 32ft+32ft=64Ft
- Width of Chiller=7ft
- Depth of Chiller=5ft
- Temperature of incoming water= 1.8ºC
- Temperature of outgoing water=7ºC
- Chlorine Concentration=22-45ppm
- Incoming Chlorinated Water sources=2
- Outgoing Water Sources=2
- No of Blades=12+12=24

Trial No2:

Giblet Chiller

- Incoming water source=1
- Outgoing water source=1
- Temperature of incoming water=1.8ºC
- Temperature of Giblet=6ºC
- Length of Giblet Chiller=8.5ft
- Width of Giblet Chiller=3.5ft
- Depth of Giblet Chiller=1ft

Trial No3:

Shank Chiller

- Incoming water source=1
- Outgoing water source=1
- Temperature of shank chiller=11-12ºC
- Length of shank chiller=13ft
- Width of shank chiller=3ft
- Depth of shank chiller=1.5ft
- No of Blades=16
- Air blower=14

Trial No4:

Dimension of Crates

1. Purple Crate:
   - Length=1.5ft
   - Width=1ft
   - Depth=7inch
2. Blue Crate:
   - Length=1.10ft
   - Width=1.2ft
   - Depth=6inch
3. Yellow Crate:
   - Length=1.7ft
   - Width=1ft
   - Depth=7inch
4. Dark blue bucket:
   - Length=11.5ft
   - Width=1ft
   - Depth=1ft

Trial no. 5:

Time for a carcass in spin chiller

Carcass no.	Time Duration in Spin chiller
01	45:28 Minutes
02	46:18 Minutes
03	48:34 Minutes
04	44:53 Minutes
05	49:42 Minutes

Trial no. 6:

Dimensions of Products:

Product	Length(cm)	Width(cm)
Drumsticks	10.16	5.08
	11.43	5.5
	10.16	5.08
	10.66	5.58
3 joint Wings	17.78	5.08
	17.78	5.08
	17.27	5.08
	15.24	4.57
Ribs	10.16	6.35
	10.16	7.11
	10.16	6.35
	10.16	7.62
Keel	7.62	7.62
	7.11	7.87
	7.62	7.62
	7.11	7.11

Thigh	7.62	7.62
	9.6	98.12
	10.16	8.12
	8.89	7.62
KFC Zinger	11.43	7.62
	10.16	7.62
	10.16	7.62
	10.66	8.38
Junior Zinger	10.16	5.08
	9.65	5.58
	10.66	9.58
	9.65	5.58
KFC Burger Breast	10.16	6.35
	11.43	6.35
	10.16	6.35
	10.16	6.35
Hot Shot	3.81	2.54
	3.04	3.04
	3.81	3.81
	3.3	4.0
J&J breast	10.66	7.6
	12.70	7.11
	11.68	7.62
	11.43	6.35
Tender line Stripe	12.70	3.04
	12.70	2.79
	12.44	3.30
	12.70	3.81
Niblet	7.62	5.08
	7.11	5.08

Drumette	8.38	4.57
	7.62	3.81
KFC Breast Strip	13	3.4
	12	3.5
	13	3.2

Trial No 7:

Easy Grader:

Breasts:

Sr. #	70-100g	140-180g	100-120g	180-220g	120-240g
01	88	142	115	216	140
02	90	152	121	218	114
03	102	162	102	236	143
04	92	194	133	196	137
05	96	170	101	216	146

Trial No 8:

Trials of Zinger Weight:

KFC Zinger: (85-100)	**92**
	96
	98
	86
Junior Zinger (75-85)	82
	84
	80
	84

Trial No 9:

Yield Trials 0f 5 Birds:

Yield Trial		
Names	**Weight (kg)**	**Percentage %**
Live Bird	7.61	
After Blood Removal	7.320	3.81
After Feather Removal	6.780	10.9
Shanks Weight	0.288	3.78
Liver Weight	0.202	2.65
Gizzard Weight	0.104	1.36
Heart Weight	0.034	0.44
Offal + Intestine weight	0.416	5.46
Carcass weight	5.564	73.11
Skin + liver + gizzard +heart +carcass	5.904	77.58
Blood + offal + feather weight	1.706	22.41

By Pieces Yield of Carcass 1		
Parts	**Weight (g)**	**Yield %**
Breast	194	23.04
Wings	92	10.92
Legs	244	28.97
Neck	20	2.37
Tenderloin	42	4.98
Soup bone	212	25.17
Skin	34	4.03
Tail	04	0.47
Total:	**842**	

By Pieces Yield of Carcass 2		
Parts	**Weight (g)**	**Yield %**
Breast	410	22.11
Wings	184	9.93
Legs	568	30.66
Neck	32	1.72
Tenderloin	86	4.64
Soup bone	476	25.70
Skin	84	4.53
Tail	12	0.64
Total:	**1852**	

By Pieces Yield of Carcass 3		
Parts	**Weight (g)**	**Yield %**
Breast	154	19.84
Wings	90	11.62
Legs	224	28.86
Neck	20	2.57
Tenderloin	40	5.15
Soup bone	214	27.57
Skin	28	3.60
Tail	06	0.77
Total:	**776**	

By Pieces Yield of Carcass 4		
Parts	**Weight (g)**	**Yield %**
Breast	250	23.10
Wings	110	10.16

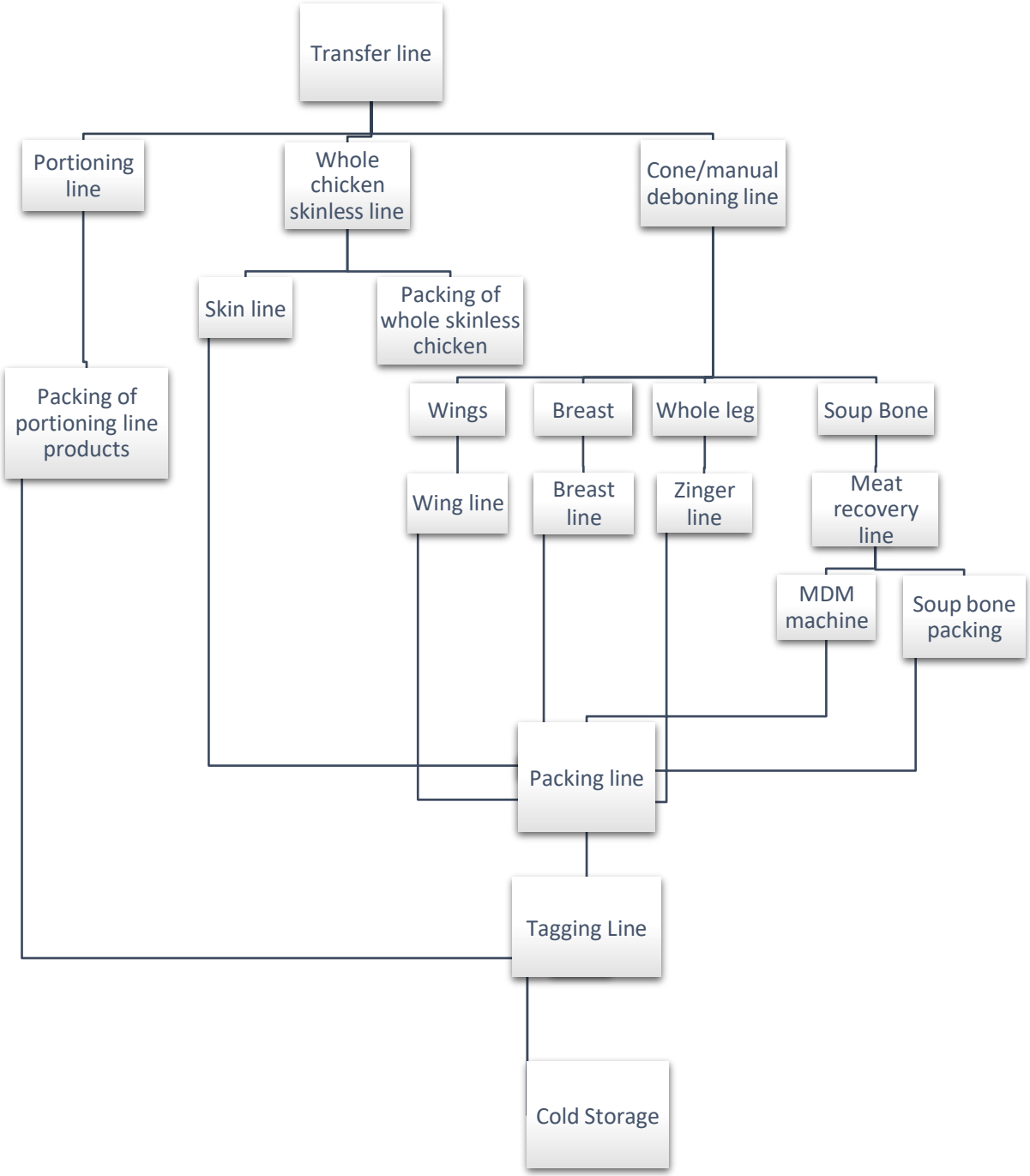
Legs	322	29.75
Neck	20	1.84
Tenderloin	44	4.06
Soup bone	280	25.87
Skin	48	4.43
Tail	08	0.73
Total:	**1082**	

By Pieces Yield of Carcass 5		
Parts	**Weight (g)**	**Yield %**
Breast	254	22.75
Wings	114	10.21
Legs	328	29.39
Neck	24	2.15
Tenderloin	50	4.48
Soup bone	280	25.08
Skin	56	5.01
Tail	10	0.89
Total:	**1116**	

Temperature monitoring in cutup area:

Temperature in cutup area is evaluated after each 01 hr. by using probe. This temperature should be in critical range so that no hazards will produce due to temperature fluctuation.

Layout of Cut up area:



Refrigeration System:

In cold storage, products are stored under cold temperature. When product is packed then it is passed through metal detector to ensure that there is no any piece of metal present in this product. Then this product is sent for storage in different storage rooms according to requirement.

There are 04 types of storage rooms:

Sr. No.	Name	Temperature range
01	Ante room	0-4ºC
02	Palletizing room	0-4ºC
03	Blast freezer room	-35ºC
04	Cold Storage room	-18ºC

1. Ante room:

In anteroom raw meat is temporary stored under chilled temperature (0-4ºC). In ante room product is kept to maintain its temperature in chilled environment to retard the growth of microbes so that there will be no effect of microbes on meat.

2. Palletizing room:

In palletizing room, meat is kept to defrost under chilled temperature. Temperature range of this area is (0-4ºC). Raw meat is temporary stored under chilled temperature (0-4ºC). Raw meat can be kept for 05 days in chilled room.

3. Blast freezer:

In blast freezer room, all raw meat and further processed meat is kept under -35ºC. Ammonia gas is used as coolant. Which flows in pipes of blast freezer and temperature becomes low up to- 35ºC. Raw meat is kept in blast freezer for 08 hours. Then it is sent in cold storage.

4. Cold Store:

In cold storage rooms, All the Raw chicken and further processed products are kept under -18°c temperature. There are 06 cold storage rooms here. Each cold storage is specific for different products. Their details are given below.

Sr. No.	Cold Storage	Products
01	CS # 01	Raw Chicken Products
02	CS # 02 & 03	Raw Chicken (Branded)
03	CS # 04	Further Processed products
04	CS # 05& 06	Raw Chicken (Food service)

Dispatch Area:

In dispatch area all products according to the order from customers are kept. And loaded in vehicles to send into market or other ware houses. Temperature of Dispatch area is 10°C. There are 03 dispatch bays that are used to load the vehicles.

There are following reports that are made produced by DA department in Cold storage and Distribution are

1. Daily Products Dispatch report.
2. Temperature monitoring of delivery Vehicle after charging.
3. Product checking for FIFO at order preparation for market.
4. Product and Vehicle checking at loading.
    i. Cleaning Status.
    ii. Product Condition.

Diagnostics and food analysis laboratory:

The diagnostics and food analysis laboratory is an integral part of quality production. The international standard, well equipped laboratory is the major contributor in production process it not only monitors the entire integration process but also regulates it to ensure that all the chicken and chicken products are full of nutrition, healthy and safe.

Tests performed in laboratory:

Food Microbiology:

i. TPC
ii. Salmonella
iii. E.coli
iv. Coliform
v. E.coli O157:H7
vi. Campylobacter
vii. Listeria
viii. Bascules
ix. Staph
x. Yeast
xi. Mold

Proximate Food analysis:

i. Crude Protein
ii. Fat Content
iii. Moisture
iv. Ash Content
v. Crude Fiber
vi. Free Fatty Acids (FFA)
vii. Peroxide Value
viii. Acidity
ix. Availability of Free Chlorine

Molecular Section

i. RT-PCR

ii. PCR
iii. DNA/RNA Extraction
iv. Electrophoresis
v. RFLP
vi. DNA/RNA Quantification

Health/ Diagnosis

i. ELISA
ii. HI
iii. SPAT
iv. Salmonella Identification by cero typing
v. Water testing
vi. Poultry farm environmental monitoring

Microbial Testing and Examination:

1. Media preparation:

A culture medium is liquid or gelatinous substance that contains essential nutrients, to cultivate target microorganisms or tissues, for further purposes. Culture media preparation in one of the routine tasks common in many microbiology laboratories. This is true in the food industry, where producers regularly monitor food and environmental samples for spoilage and pathogenic microbes as an early indication of breakdown in processing hygiene. Bacteria and other microbes use a culture medium as a synthetic nutritional substrate that mimics optimal conditions for growth. To get a representative microbial population from samples, it is important to give the very best growth conditions that support microbial flora.

Classification of Culture Growth Media:

These are classified into six types:

1) Basal media,
2) Enriched media,
3) Selective
4) Indicator media,
5) Transport media
6) Storage media.

1) **Basal Media.** Basal media are those that may be used for growth (culture) of bacteria that do not need enrichment of the media. Examples: Nutrient broth, nutrient agar and peptone water. Staphylococcus and Enterobacteriaceae grow in these media.
2) **Enriched Media.** The media are enriched usually by adding blood, serum or egg. Examples: Enriched media are blood agar and Lowenstein-Jensen media. Streptococci grow in blood agar media.
3) **Selective Media.** These media favors the growth of a particular bacterium by inhibiting the growth of undesired bacteria and allowing growth of desirable bacteria. Examples: MacConkey agar, Lowenstein-Jensen media, tellurite media (Tellurite inhibits the growth of most of the throat organisms except diphtheria bacilli). Antibiotic may be added to a medium for inhibition.
4) **Indicator (Differential) Media.** An indicator is included in the medium. A particular organism causes change in the indicator, e.g. blood, neutral red, tellurite. Examples: Blood agar and MacConkey agar are indicator media.
5) **Transport Media.** These media are used when specie-men cannot be cultured soon after collection. Examples: Cary-Blair medium, Amies medium, Stuart medium.
6) **Storage Media.** Media used for storing the bacteria for a long period of time. Examples: Egg saline medium, chalk cooked meat broth

2. Material Needed:

- Flask
- Measuring Cylinder
- Distilled Water
- Spatula
- Aluminum Foil
- Stir Bar
- Scientific Weighing Balance
- Thread
- Marker
- Magnetic Heat Stirrer
- Autoclave

3. Procedure:

i. Take a flask to prepare the culture growth media.

ii. Measure the distilled water quantity by measuring cylinder and add into the flask.

iii. Add the stir bar into the flask.

iv. Take a small piece of foil paper and place it on scientific weighing balance.

v. Tare the weight of the scientific weighing balance.

vi. Now, weigh the media according to requirement on aluminum foil.

vii. Add the media in flask and cover the mouth of flask with foil paper.

viii. Tie the foil paper with thread and write the name of media on foil paper with marker so that we can identify the relevant media.

ix. Now, place the media on magnetic heat stirrer and heat it until it boils. (Some specific media aren't supposed to be boiled.)

x. After boiling, place the media in autoclave at 121°C, 15 psi for 15 minutes. (Some specific media aren't supposed to be autoclaved.)

xi. After removing from autoclave, place the media in hot water bath or incubator at 45-55°C for storage.

Some commonly used media for culture growth and their specifications.

Sr. no.	Media	Composition	Autoclave	pH	Microbes
01	XLD	53g/1L	No	7.4±0.2	Salmonella
02	EMB	36g/1L	Yes	7.2±0.2	E.coli
03	MYP	46g/1L	Yes	7.2±0.2	Bacillus
04	SMA	40g/1L	Yes	7.3±0.2	TPC
05	VRBA	41.5g/1L	No	7.4±0.2	Coliform
06	RVS Broth	26.75g/1L	Yes	5.2±0.2	Salmonella
07	EE Broth	45g/1L	No	7.2±0.2	E.coli
08	Listeria	57.5g/1L	Yes	7.0±0.2	Listeria
09	Campylobacter	22.7g/1L	Yes	7.4±0.2	Campylobacter
10	Clostridium	49g/1L	Yes	7.0±0.2	Clostridium
11	SDA	47g/1L	Yes	7.0±0.2	Yeast, Mold
12	Sorbitol	50g/1L	Yes	7.1±0.2	E.coli O157

13	Buffered Peptone Water	20g/1L	Yes	7.0±0.2	Dilution for sample
14	TSA	40g/1L	Yes	7.3±0.2	TPC
15	Ringer's Solution	1 tab/500ml	No	7.0±0.2	Swab Filling

2. Sample preparation for FP & PP Products:

Sample are prepared from further processing products and primary processing products to examine the microbial count in these products.

Materials Needed:

- Polythene Bag
- Sample Products
- Glass Beaker
- Peptone Water
- Autoclaved Scissors
- Scientific Weighing Balance
- Biosafety Cabinet

Procedure:

i. Wear the PPE (personal protective equipment) including face mask, hair net and latex gloves before working in biosafety cabinet.
ii. Take a Polythene bag and mark it according to sample and its sampling date.
iii. Weigh 25 gm of sample on scientific weighing balance with the help of autoclaved scissors and add it into the polythene bag.
iv. Add 225 ml peptone water in polythene bag with sample.
v. Place the sample in pulsifier for 15 seconds for pulsification of the sample.

3. Sample and media pouring:

Sample and media are poured in petri dishes for culture growth and their examination.

Material needed:

- Petri dishes
- Micropipette
- Micropipette tips

- Spreader
- Ethanol
- Bunsen burner

Procedure:

i. Take a sterile petri dish & open it in biosafety cabinet.
ii. Measure the 1ml sample with the help of micropipette.
iii. Add the measured sample in petri dish and discard the tip of micropipette.
iv. Now, add approximately 15-25 ml of corresponding media into the petri dish carrying sample.
v. Now, place the petri dishes at room temperature to allow the media to be solidified.
vi. Place the petri dishes into the refrigerator overnight for proper growth of microbes.
vii. In case of *Salmonella* and *E.coli O157*, the sample is spread into the petri dishes with pre solidified media.
viii. Every time when the sample is spread, the spreader is sterilized by ethanol and then flame burn.

4. Examination of Colonies:

i. After suitable time of culture growth, the petri dishes are examined with naked eye.
ii. If the colonies are in less number, then they are directly counted and multiplied with correction factor of $1/10^{th}$ dilution factor.
iii. If colonies are excessive to count, then petri plate is divided into suitable portion by marker so that they can be counted easily.
iv. Then, the colonies counted in one portion of petri plate are multiplied with number of total portions of petri plate.
v. Multiply the colonies count with $1/10^{th}$ dilution factor.

1) **Food products testing for detection of E.coli:**

i. Procedure of food testing was performed in Biosafety Cabinet, UV Light of biosafety cabinet was turned on before working.
ii. For E-coli detection plates of Violet Red Bile Agar were prepared and labelled properly according to no and type of samples.
iii. Samples were initially diluted by taking 25g sample in 225ml peptone water to make 10 fold dilutions of the given sample.
iv. After making the initial dilutions the 50 ul samples from suspensions were spread across each plate by using a sterile plate spreader.
v. Then plates were allowed to dry for few minutes.
vi. After drying plates were incubated at 37℃ overnight.
vii. Following results were observed.

Results:

- Lactose fomenters give purple red colonies with or without a zone of precipitation.
- Non lactose fomenters give colorless to transparent colonies in case of positive samples.
- If there is no microbial growth it indicates that no bacterial contamination is there.
- The results were interpreted on the basis of absence and presence of colonies of E-coli as positive or negative.

2) **Food Products testing for detection and isolation of E-coli 0157**

i. Procedure of food testing was performed in Biosafety Cabinet, UV Light of biosafety cabinet was turned on before working.
ii. Samples were initially diluted by taking 25g sample in 225ml peptone water to make 10 fold dilutions of given samples.
iii. After making initial dilutions samples were incubated at 37℃ for 6 hours.
iv. 50 ul solutions from initial suspensions were suspended in test tubes containing 9ml EE broth by using micro pipette then incubated at 42℃ overnight.

v. Plates of Sorbitol agar were prepared and labelled properly according to no and type of samples.
vi. 50ul samples from the suspensions were spread across each plate using sterile spreader.
vii. Then incubated at 37℃ overnight.

Results:

- The results were interpreted as positive or negative depending upon presence or absence of E-coli colonies.
- 0157 gives pink colored colonies on sorbitol agar.

3) Food testing for detection of Staphylococcus

i. Procedure of food testing was performed in Biosafety Cabinet, UV Light of biosafety cabinet was turned on before working.
ii. Plates of Baird parker agar were prepared according to number and types of samples.
iii. Samples were initially diluted by taking 25g sample in 225ml peptone water to make 10 fold dilutions of given samples.
iv. After making the initial dilutions the 50ul of samples from suspensions were spread across each plate by using a sterile plate spreader.
v. Then plates were allowed to dry for few minutes.
vi. After drying plates were incubated at 37℃ overnight.
vii. Following results were observed.

Results:

- Results were interpreted as positive or negative on the basis of absence and presence of colonies.

4) Food testing for the detection and evaluation of Yeast and Mold

i. Samples were tested regularly for the presence of Yeast and Mold.
ii. Procedure of food testing was performed in Biosafety Cabinet, UV Light of biosafety cabinet was turned on before working.
iii. Plates of SDA were prepared and labeled according to number of samples.

iv. Samples were initially diluted by taking 25 g sample in 225 ml peptone water to make 10 fold dilutions of given samples.

v. After making initial dilutions the 50ul samples were spread across each plate by using a sterile spreader.

vi. Then plates were allowed to dry for few minutes.

vii. Plates that were inoculated for mold detection were incubated at room temperature for overnight.

viii. Plates that were used for detection of Yeast were incubated at 37℃ for overnight.

Results:

- Results were observed on the basis of colonies obtained on plates.
- Yeast grows creamy to white colonies.
- Molds grow as filamentous colonies of different colors.

5) Food testing for the detection and isolation of salmonella

i. Procedure of food testing was performed in Biosafety Cabinet, UV Light of biosafety cabinet was turned on before working.

ii. Samples were initially diluted by adding 25g samples in 225ml peptone water to make 10 fold dilutions of given samples.

iii. After making initial dilutions samples were incubated at 37℃ for 6 hrs.

iv. 1ml samples from initial dilutions were suspended in 9ml RVM broth and incubated at 42 ℃ for overnight.

v. Plates of XLD agar were prepared and 50 ul samples were spread across each plate by using sterile spreader.

vi. Then plates were incubated at 37℃ for overnight.

Results:

- Following results were observed on the basis of colonies appearance.
- Salmonella produces colonies with the black centers.

6) Food testing for the detection and isolation of coliform

i. Food samples were tested regularly for the detection and isolation of coliforms to ensure the food safety of food products.
ii. Procedure of food testing was performed in Biosafety Cabinet, UV Light of biosafety cabinet was turned on before working.
iii. Plates of MacConkey agar were prepared and labeled according to the no and type of samples.
iv. Samples were initially diluted by adding 25g sample in 225ml peptone water to make 10 fold dilutions of given samples.
v. After making initial dilutions 50 ul from samples were spread across each plate by using sterile spreader.
vi. Plates were allowed to dry for few minutes. Incubated at 37 ℃ for overnight.

Results:

- Following results were observed on the basis of colonies appearance.
- Coliforms give pink colored colonies on MacConkey agar.

7) Food testing for TPC (Total Plate Count)

i. Procedure of food testing was performed in Biosafety Cabinet, UV Light of biosafety cabinet was turned on before working.
ii. Initials dilutions were made by adding 25 g sample in 225 ml peptone water.
iii. Plates of SMA were prepared and labeled according to type and no of samples.
iv. 50ul samples from initial dilutions were spread across each plate by using sterile spreader.
v. Plates were allowed to dry for few minutes.
vi. Incubated at 37 degrees centigrade for overnight.

Results:

- Results were interpreted by counting colonies on Petri plates
- CFU = No of colonies ×Dilution factor ×Correction factor.

Proximate Food Analysis

1. Procedure for Determination of Ash Content:

Objective:

1. To determine percentage ash in food product
2. For nutritional labelling

Scope:

All type of food samples coming from plant

Equipment:

- Crucible
- Spatula
- Weighing balance
- Muffle furnace
- Desiccator

Procedure:

i. Take a crucible & weigh it.
ii. Take 2 grams of sample with spatula in crucible.
iii. Then put the crucible on heater to smoke free the sample for approximately 15-20 mins.
iv. After smoke free the sample, Put the crucible in muffle furnace for hours at 600-650C 5.
v. Take out crucible from Muffle furnace, and then Place it in desiccator for approximately for 15-20 mins.
vi. Weigh the crucible after drying.
vii. Apply the formula & calculate.

Formula:

$$\text{Percentage Ash= A} = \frac{\text{weight before drying – weight after drying}}{\text{Sample weight}} \times 100$$

$$=100-A$$

2. Procedure for Determination of Moisture Content:

Objective:

3. To determine precise amount of moisture
4. For nutritional labelling

Scope:

This procedure is applicable for the determination of dry matter on ground air-dry or partially dried (85% dry matter) forages with low volatile and content. Samples dried by this procedure are not appropriate for subsequent fiber, lignin, or acid detergent insoluble nitrogen analysis. Volatile acids and alcohols may be lost from fermented samples.

Basic Principle:

Moisture is evaporated from the sample by oven drying. Dry matter is determined gravimetrically as the residue remaining after drying.

Equipment:

- Forced-air drying oven at 135°C ± 2°C
- Oven should be equipped with a wire rod shelf to allow the circulation of air.
- Oven should be vented and operated with vents open.
- Analytical electronic balance
- Glass petri dish
- Desiccator

Safety precautions:

Use standard precautions when working around electrical equipment or glassware make sure that all electrical equipment is properly grounded and installed and maintained by qualified electricians

Procedure:

i. Take empty dry glass petri dish/crucible and weigh it (W_1).
ii. Add 05-10 gram of well mixed and minced sample in petri dish/crucible (W_2).
iii. For feed samples, place it in Hot air oven at 135°C for 2 hours & for food sample temperature should be 105°C for overnight.
iv. Dried sample is removed carefully from Oven and place it in desiccator.
v. Immediately cover desiccator and allow it to cool to room temperature
vi. Remove sample petri dish/crucible form desiccator after 15-20 minutes

vii. Weigh the dried sample petri dish/crucible (W_3).

viii. Calculate the percentage moisture content

Formula:

$$\text{Percentage moisture \%} = \frac{(W_1+W_2) - W_3}{W_2} \times 100$$

3. Procedure for Determination of Crude protein Content:

Objective:

1. To determine percentage Crude protein in food product
2. For nutritional labelling

Scope:

All types of food sample coming from plant.

Equipment & Chemicals:

- Flask
- Spatula
- Weighing balance
- Fume hood
- Kjeldhal Apparatus
- $CuSO_4$
- K_2SO_4
- 40% NaOH
- H_2SO_4
- 2% Boric Acid

Procedure:

It has been divided into three basic parts.

1. **Digestion:**
    i. Take 2g of sample in filter and put it in 1L digestion flask.
    ii. Add 5g of digestion mixture consisting of K_2SO_4: $CuSO_4$: Selenium (90:9:1) in the digestion.
    iii. Then add 30ml of conc. sulfuric acid.
    iv. Place the sample containing flask on heater for 4 hrs.
    v. During digestion there will be 3 colors appearance respectively Le. Firstly black, then dark brown & at the end Green or colorless.
        - Then let the flask to cool for some time & add distilled water to dilute the digested sample up to 250ml.

2. **Distillation:**
    i. Take 15ml Boric Acid (2%) solution containing 0.2ml. CP Indicator (Methyl Red 0.66g + Bromocresol Green 0.33g in 100mL 95% Ethanol) in 100ml beaker.
    ii. Place the beaker in such a way that distillation receiving end will dipped in the Boric Acid solution.
    iii. Take 10ml diluted sample in Kjeldhal unit, then add 10ml NaOH (40%). Place the dropper in position & let the reaction start with steam.
    iv. Ensure the condensing water is always running.
    v. Allow the distillation of ammonia for 5 mins Into the Boric Acid solution after changing the color from red to green.
    vi. Remove the beaker.
3. **Titration**
    i. Titrate the distillate with 0.05N Sulfuric Acid. The color changes from green to red.

Formula:

Nitrogen percentage = Burette reading ×14× 0.05×250×100/1000×10×sample weight

Crude protein (CP)% = 6.25 × Nitrogen percentage

4. Procedure for Determination of Crude Fat Content:

Objective:

1. To determine percentage crude fat in food product
2. For nutritional labelling

Scope:

All type of food samples coming from plant

Equipment & Chemicals:

- Filter paper
- Beaker
- Desiccator
- Weighing balance
- Soxhlt Apparatus

Procedure:

i. Weigh 1.5-2g sample on a filter paper, close it tightly put it in Soxhlet thimble.
ii. Then add n-Hexane slightly up from one siphon.
iii. Allow the extraction proceed for 2.5-3 hours, set the temperature at 92°C.
iv. Ensure the water is running in condenser all the time during procedure
v. Weigh the 100ml empty beaker (w_1)
vi. After 25-3 hours, take sample treated n-Hexane in the beaker.
vii. Put the beaker in the oven at 100°C for drying.
viii. Cool the oil content beaker in desiccator.
ix. Weigh the oil beaker.

Formula:

Crude Fat (CF) % = (W_2-W_1)/sample weight×100

5. Procedure for Determination of Acidity:

Objective:

1. To determine percentage acidity in raw material

Scope:

All type of food samples coming from plant

Equipment:

- Weighing Balance
- Beaker
- Pipette

Procedure:

i. 2g Sample in 100ml or 250ml flask.
ii. 20ml distilled water added.
iii. Added few drops of phenolphthalein indicator.
iv. 0.1N NaOH is used for titration, Burette reading is noted.

Formula:

Percentage Acidity = Vol. of NaOH used ×0.1×0.064×100/Sample weight

6. Procedure for Determination of Per Oxide Value:

Objective:

1. To determine percentage per oxide value of oil sample/products oil
2. For nutritional labelling

Scope:

All type of oil samples coming from plant

Equipment:

- Weighing Balance
- Beaker
- Pipette
- 1% phenolphthalein
- 0.1N NaOH

Procedure:

i. Take 5 gm of oil sample.
ii. Add 50ml of acetic acid: chloroform (30mL: 20mL).
iii. Add 0.5ml of saturated potassium iodide & Shake vigorously & stay it for 1 minute.
iv. Add 30ml Distilled water
v. Add few drops of 1% starch indicator until color get bit dark. 6. Then titrate it with 0.1N $Na_2S_2O_3$.

Formula:

Per Oxide value (m.eq/kg) = Burette reading ×0.1×1000/Sample weight.

7. Procedure for Free Fatty Acid Determination in Frying Oil:

Objective:

1. To determine free fatty acids percentage in frying oil

Scope:

All type of oil samples coming from plant.

Procedure:

i. Measure 5g of Oil sample in a beaker.
ii. Measure 30 ml of absolute ethanol in another beaker.
iii. Boil the absolute ethanol.
iv. Add 5-8 drops of phenolphthalein indicator in Ethanol and Add 0.1N NaOH drop by drop until light pink color appears.
v. Then add this mixture in to the measured Oil sample.
vi. Then titrate it with 0.1N NaOH until light pink color again appears.
vii. Note the volume of 0.1N NaOH used.

Calculation:

FFA (%) = Ax 0.1 x 282 x100/ (B x 1000)

- A= Volume of 0.1N NaOH used during titration
- B =Weight of Oil
- 0.1= Normality of NaOH

282.47g/mol = Molar Mass of Oleic acid