



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2023; 12(6): 3084-3086  
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[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 02-04-2023  
Accepted: 03-05-2023

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## Estimation of process loss during industrial processing of broiler chicken

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### Abstract

A study to ascertain the process loss from commercial cuts of poultry as required by various commercial outlets was carried out at large scale mechanised poultry processing unit. The following commercial cuts were analysed for the purpose: Boneless, 9-piece cut, retail precut (23+1 pcs), Currycut (22+1) and food service cuts. Representative samples (minimum 10) were taken for each of the mentioned cuts/products for analysis. Among the commercial cuts viz. boneless, 9-pc cuts, Retail precut and food service cuts considered for the study boneless cuts accounted for the maximum process loss which was 3.46 percent in comparison with other cuts which were, 0.80% in 9-piece cuts, 2.25% in retail precut, 0.87% in commercial curry cuts, 0.22% in food service cut with skin and 1.63% in food service cut without skin percentage respectively. The loss is accounted towards the loss of meat during deboning, lack of skilled personals and other manual errors while processing.

**Keywords:** Poultry processing, Process loss, boneless

### Introduction

In India of the total birds produced about 4.5-5 per cent are scientifically and hygienically processed and the rest are sold live. The number of chicken processing units in the entire country is limited to single digits (the big ones being Venky's Ltd of the VH group, Suguna poultry Ltd and Godrej Agrovvet Ltd). Depending on market demand, poultry can be sold as a whole, ready-to-cook bird, split into two halves, separated into different parts such as wings, whole breast, deboned fillets, drumstick, thigh, whole leg, etc. The growing demand for convenience foods that require minimal preparation efforts have been pushing the development of a wide range of products with high added value, such as ready-to-eat meals (Franciny C. Schmidt, Joao B. Laurindo, 2014).

Processing is the cutting of the dressed meat into ready-to-cook portions. Weight loss during slaughter and processing of meat from live animals to table-ready cuts is normal. Carcass yield is an important production criterion and is expressed as the dressing percentage ( $[\text{dressed carcass weight}/\text{live weight}] \times 100$ ). However, since it expresses a ratio of live weight to carcass weight and many factors influence these fractions (e.g., alimentary tract size and fill, slaughtering procedures, fleece or skin mass, distribution of body fat, and secondary sex characteristics), the dressing percentage must be interpreted carefully and comparisons made within species, within breed types, and within slaughtering procedures (Casey *et al.*, 2003). It is important for producers to understand the concept of dressing percentage and weight loss during processing and storage because it can equate to profitability (Jeannine P. Schwehofer, 2011).

Slaughtering removes blood, hide, and inedible parts from the animal. Processing accounts for another loss in weight as excess fat and bone are trimmed away. Not only does trimming make meat more appetizing, but it also eliminates extra storage space and further kitchen preparation. With this motto new ventures are growing in the country with various cuts or products which are viewed and welcomed by the consumers. These ventures have their own specification for their products to make them unique in the market thereby to have a share exclusively for them among the consumers. When such venture demand specific cut/products to suit their purpose from a processing plant, the loss of weight during processing for that cut/product must be accounted to ensure proper planning and to determine the price/cost of processing.

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With this in mind the present study was carried out to estimate the process loss occurring during various commercial cuts of poultry products.

### Materials and Methods

The following commercial cuts were analysed for the purpose: Boneless, 9piece cuts, retail precut (23+1 pcs), Currycut (22+1) and food service cuts. Representative samples (minimum 10) were taken for each of the mentioned cuts/products for analysis. Weighment of the samples and the cuts/products were done out using a digital balance whose accuracy is 0.001 g.

#### Boneless

Fifty dressed carcass weighing within a range of 1.6 – 1.7 kg were taken as representative samples from the boneless chicken line. The following cuts were assessed from the samples:

BBL, LBL, Supreme, Flap meat. The yield and process loss from the samples were measured in kilograms from the stationary deboning cones.

- **BBL (Breast Boneless)** is the two approximately equal portion of a trimmed breast obtained by cutting through the breastbone (sternum) along the median line.
- **Supreme** is an elongated fusiform muscle (supracoracoid muscle or deep pectoral) found on each side of the keel bone (sternum).
- **LBL (Leg Boneless)** is the portion of the whole poultry obtained by cutting at the natural seam through the hip joint (articulation between the femur and the pelvis) without bone.
- **Flap meat** is the back from which the meat adhering to the pelvic bones has been removed.

The by-products were also measured to accurately arrive at the processing loss. The by- products from the processing for boneless cuts includes full Wing, leg Bones, skin and PCP.

#### 9 Piece Cut

Ten dressed carcass weighing about 1.15- 1.25 kgs were taken as representative samples for 9 PCS Cuts which include: Thigh (2), Drumstick (2), Wings (2), Ribs (2), Keel (1). The yield and process loss of the samples was measured in the KFC portioning machine in kilograms.

- **Thigh** is the proximal portion of the leg that is separated from the whole poultry by cutting at the natural seam through the hip joint and from the drumstick by a straight cut through the knee joint (*femoro-tibial articulation*). It may include pelvic meat but shall exclude abdominal

skin and excess fat.

- **Drumstick** is the distal portion of the leg that is separated from the thigh by a straight cut through the knee joint (*femoro-tibial articulation*).
- **Wing** refers to that portion of the whole poultry obtained by cutting through the shoulder joint (articulation between the clavicle, coracoid and humerus). It includes the wing drumette, winglet and may include the wing tip.
- **Keel piece** is the pointed posterior tip of the whole breast before splitting (approximately one third of the whole breast).
- **Rib piece** is obtained by removing the keel piece from the whole breast. The remaining part is split into right and left halves.

The by-products were also measured to accurately arrive at the processing loss. The by-products from the processing for 9 Piece cuts include fat, neck, kidney and vent.

#### Retail precut (23+1 PCS) and Currycut (22+1)

Ten dressed birds weighing of 1.0 to 1.2 kg were taken as samples from retail line. The yield and process loss of the samples was measured.

**Pre-cut pieces include:** Breast (6), Neck (2), Pelvic Part (4), Thigh (6), Wing (2), Drumstick (2), Liver and Gizzard (1). In curry cut liver and Gizzard were left out. The by-products were also measured to accurately arrive at the processing loss.

#### Food Service Cuts

Ten dressed birds taken as representative samples from food service line within the range of 1.1 to 1.3 kg. The yield and process loss of the samples was measured for whole chicken with skin, whole chicken without skin, whole chicken without neck and vent, whole chicken without skin, fat, kidney, wingtip, neck and vent.

### Results

The results obtained from study on estimation of process loss from commercial cuts of poultry carcass is summarized below:

#### Boneless

The yield in kilograms and percentage of commercial boneless cuts *viz.* breast boneless, supreme, leg boneless and flap meal are summarised in the table 1. The percent yield of breast boneless, supreme, leg boneless and flap meal were 21.11, 4.69, 20.49 and 3.09 respectively. This resulted in an overall yield of 49.38 percentage of total dressed inputs. The by-products generated in the processing accounted for 47.16 percent.

**Table 1:** Percent process loss in processing for various commercial cuts from poultry carcass

Type of Cut	No. of birds	Input (kg)	Output(kg)	Product yield%	By product (Kg)	By product yield (%)	Loss (%)
Boneless	50	81.00	40.00	49.38	38.20	47.16	3.46
9 piece CUT	10	11.91	10.96	92.02	10.96	7.18	0.80
Retail precut (Skinless)	10	12.05	10.34	85.88	1.43	11.87	2.25
Currycut (Skinless)	10	12.07	9.41	77.94	2.56	21.19	0.87
Retail precut (with skin)	20	24.48	24.32	99.35	0.10	0.42	0.22
Currycut(with skin)	20	24.48	21.68	88.55	2.40	9.82	1.63

#### 9 PCS Cut

The yield in kilograms and percentage for commercial KFC-9

PCS cut are summarised in the table 1. The percent yield from 10 birds with a input weight of 11.91 kgs was 10.96 kg which

was 92.02 percentage. The by-products generated in the processing accounted for 7.18 percent and a percent loss of about 0.80 (0.09 kg) due to processing.

### Retail pre-cut (23+1 PCS) and Curry cut (22+1)

The yield in kilograms and percentage for commercial retail pre-cuts and curry-cuts are summarised in the table 1. With respect to retail pre-cut, the percent yield from 10 birds with a input weight of 12.05 kgs was 10.34 kg which was 85.88 percentage. Whereas for curry-cuts, the percent yield from 10 birds with a input weight of 12.07 kgs was 9.41 kg which was 77.41 percentage. The by-products generated in the processing accounted for 11.87 percent in retail pre-cut and 21.19 percent for curry-cuts. The percent loss encountered due to processing with respect to retail pre-cut and commercial cuts were 2.25 and 0.87 percent respectively.

### Food Service Cuts

The yield in kilograms and percentage of food service cuts i.e. whole chicken with skin and without skin carried out using twenty birds is presented in table 1. With respect to food service cut with skin, the percent yield from 20 birds with a input weight of 24.48 kgs was 24.32 kg which was 99.35 percentage. Whereas for food service cuts without skin, the percent yield from 20 birds with a input weight of 24.48 kgs was 21.68 kg which was 88.55 percentage. The by-products generated in the processing were kidneys, windpipe and skin. The by-products accounted for 0.42 percent with food service cuts with skin and 9.82 percent without skin. The overall process loss encountered with respect to food service cuts i.e. whole chicken with skin and without skin were 0.22 and 1.63 percentage respectively.

### Discussion

Growing population, rapid urbanization, rising income, preference for variety food and liking for new type of prepared food and changing consumption patterns have expanded the demand for high value food commodities. Among them, the demand for poultry is expanding rapidly since poultry meat is one of the best sources of high quality protein, cheap with less fat. Sheriff and Murugan (2009) stated that changing lifestyles hopefully predict further growth in the poultry sector in future also. Processing of poultry for various cuts not only makes meat more visually appealing it also improves the ease in handling of meat. New ventures attempt various cuts which are unique with respect to appeal and recipe to stand out among various other competitors in the market. These new cuts results in certain unaccounted losses (Hidden loss) for the processing plant which needs to be ascertained to make the venture more profitable or to reduce losses to the plant. The results of the study to estimate the process loss during commercial processing of broilers is discussed herein the following paragraphs.

Among the four commercial cuts *viz.* boneless, 9 Piece cuts, Retail precut and food service cuts, considered for the study boneless cuts accounted for the maximum process loss which was 3.46 percent in comparison with other cuts which were 0.80, 2.25, 0.87, 0.22 and 1.63 percentage respectively. The increased loss maybe due to the following reasons such as:

✚ Loss of meat along with bone as scrape meat

Except for boneless cuts all the remaining cuts were carried out using a portioning machine wherein the precision of the

cuts were accurate and human errors were significantly reduced. Also the type or the sharpness of knife used play a significant role in this loss. Utilizing more mechanical means available nowadays for deboning or to prepare various boneless cuts may reduce the loss significantly.

1. Skill level of the manual performing deboning:
2. Boneless cut preparation is a skilled process where trained personals are required to perform the activity with ease and precision. Utilizing untrained persons or new comer in the process maybe controlled and if it necessitates the quantity of meat to be handled by them maybe reduced to avoid haste in processing resulting in increased loss.
3. Manual errors in processing: Errors in handling and weighing may also account for this loss which can be avoided by thorough inspection.
4. The quality of blade edges is also highly important. To ensure that they are of a high enough quality, similar to surgical scalpels, they must pass the paper cut test without exception. A failure to do so may result in cuts having to be made twice and this can result in damage to skin and meat. Additionally, each operation takes longer, resulting in buildup of bottlenecks, which can result in weight loss. While each of these individual issues may seem small, given the high volumes of birds processed, cumulatively, their impact is high (Eduardo Cervantes López, 2018)

### Conclusion

Proper checks and measures installed along processing operations, and the simultaneous monitoring of variables, will help to maintain yield within certain parameters, and should problems be found, they can be rectified immediately (Eduardo Cervantes López, 2016).

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