

Effects of marketing chicken meat as a whole or cut up on enterprise income

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Abstract: As research material, 521 broiler carcasses, 308 of which were cut up manually and 213 of which were cut up with machine, were used. The carcasses cut up were divided into 6 groups based on their weights. In both methods, the whole weights of the carcasses were determined first and recorded. After that, they were divided into 3 parts as wings, legs, and breast. It was found that the process of cutting up takes 12 s by hand and 50.5 s with machine. As a result of cutting up, net income increase was determined as 13.75% for manual cutting up and 11.37% for mechanical cutting up.

Key words: Broiler, carcass cut up, income, shrinkage

Piliç etinin bütün olarak veya parçalanarak pazarlanmasının işletme gelirine etkisi

Özet: Araştırma materyali olarak, 308 adedi elle ve 213 adedi makineyle parçalanan toplam 521 adet broiler karkası kullanılmıştır. Parçalanan karkaslar 6 farklı ağırlık grubuna ayrılmıştır. Her iki yöntemde de ilk olarak karkasların bütün olarak ağırlıkları tartılarak kaydedilmiş, daha sonra kanat, but ve göğüs olmak üzere 3 parçaya ayrılmışlardır. Parçalama işleminin elle ortalama 12 sn., makineyle ortalama 50.5 sn. sürdüğü tespit edilmiştir. Parçalama sonucunda net gelir artışı, elle parçalamada % 13,75; makineyle parçalamada ise % 11,37 olarak belirlenmiştir.

Anahtar sözcükler: Broiler, karkas parçalama, gelir, fire

Introduction

As well as being sold as a whole, chicken meat is also marketed in pieces to provide various cooking and taste alternatives. Beside an increase in income, cutting up also causes an increase of costs. Comparison of marginal cost and marginal revenue

resulting from marketing of broiler carcass in pieces is a very important factor for deciding the marketing style. There are many scientific studies on cutting up carcasses. Cevger et al. (1) examined the effect of cutting up chicken carcass as neck, breast, legs, and wings using a knife manually and using a power saw

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on enterprise income. In another study, Cevger et al. (2) examined the effect of selling chicken carcass as a whole or cut up as neck, wings, fillet, cutlet, drumstick, back (for soup), and bones on enterprise income according to seasons. Benoff et al. (3) studied effects of processing 7-9-week old male and female broilers with conventional and modern methods on meat yield and calculated the greatest profit variation between conventional and modern methods for leg meat. Heath (4) examined the factors affecting broiler meat yield, quality, and consumer preferences in terms of piece yields from carcasses cut up chilled and hot. Merkley et al. (5), Bilgili et al. (6), Renden et al. (7), and Acar et al. (8) examined carcass yields of eviscerated broiler carcasses and piece proportions on different lines.

The aim of this study was to examine the effects of marketing chicken carcasses of different weights cut up instead of selling as a whole on enterprise expenses and revenue.

Materials and methods

The study included 308 chicken carcasses manually cut up with knife grouped as 44 chickens weighing 1450 g and below, 58 chickens weighing 1451 to 1550 g, 48 chickens weighing 1551 to 1650 g, 53 chickens weighing 1651 to 1750 g, 48 chickens weighing 1751 to 1850 g, and 57 chickens weighing 1850 g and above, and 213 chickens mechanically cut up grouped as 36 chickens weighing 1450g and below, 29 chickens weighing 1451 to 1550 g, 37 chickens weighing 1551 to 1650 g, 35 chickens weighing 1651 to 1750 g, 33 chickens weighing 1751 to 1850 g, and 43 chickens weighing 1851 g and above. An electronic scale calibrated for 2 g weighing sensitivity was used for weighing.

The carcasses to be cut up were first weighed as a whole. Each carcass whose weight was recorded was cut into 3 parts; wings, legs (back quarter), and whole breast (with breast meat, back, bones, and skin).

The parts were weighed and recorded separately for each carcass without mixing them with the parts of the other carcasses. During the cutting up process, cutting up durations of workers were determined at various times and the average time needed for cutting up 1 carcass was calculated.

The weights of the parts were evaluated considering average market prices as of June 2006. With these prices, income gained from sales as a whole and income gained from each of the parts were calculated. The revenue of selling as a whole was subtracted from the total revenue from cut up sales, and the difference in the enterprise revenue resulting from cutting up was determined. Expense items (processing labor and energy expenses and packaging expenses) affecting the production cost were taken into account. For determining the increase in expenses, the partial budgeting method was used (9). The total of net wages paid to the workers and insurance premium were included in the labor expenses. The electric power spent during mechanical cutting up was included in the expense item regarding energy. Cutting up shrinkage was calculated by subtracting the total weights of the parts from the whole carcass weight.

Average piece weights, part proportions, part incomes, part income proportions, the costs of labor and energy spent per carcass, shrinkage value, and the difference of net and gross income per carcass were calculated using the weighing results, prices, and wages. The net income difference per carcass was calculated through the subtraction of the total of whole carcass incomes and expenses (shrinkage, labor force, and energy) from the total of part incomes. The results were compared per carcass weight groups and cutting up method. Paired-samples t-test was used to analyze the significance of difference among groups.

Results

Based on the time measurements performed throughout this study, it was found that the process of cutting up takes 12 s by hand and 50.5 s with machine. The percentages of the proportion of average carcass weights and weights of the parts are presented in Tables 1 and 2.

Tables 3 and 4 show the percentage of revenue from pieces within total revenues.

Tables 5 and 6 show the findings pertaining to the loss index based on the amount of average loss and loss rate along with the general loss rates in a carcass as a result of the cutting up process.

Tables 7 and 8 show the findings concerning the difference of net and gross income and net income index.

Table 1. Proportion of average carcass weights and weights of the parts in manual cut up (%).

Groups (g)	n	Whole (g) X ± sx	Wing (%) X ± sx	Leg (%) X ± sx	Breast (%) X ± sx
≤ 1450	44	1398.43 ± 28.04	11.72 ± 0.55	44.50 ± 1.43	43.78 ± 1.66
1451-1550	58	1497.93 ± 26.57	11.81 ± 0.52	44.12 ± 1.73	44.07 ± 1.71
1551-1650	48	1607.50 ± 31.29	11.69 ± 0.61	44.43 ± 1.39	43.88 ± 1.39
1651-1750	53	1703.25 ± 24.16	11.56 ± 0.47	43.99 ± 1.54	44.45 ± 1.62
1751-1850	48	1789.42 ± 27.45	11.50 ± 0.52	44.21 ± 1.07	44.29 ± 1.24
1850 <	57	2058.70 ± 139.46	11.40 ± 0.46	44.81 ± 1.39	43.79 ± 1.51
General	308	1685.33 ± 226.20	11.61 ± 0.54	44.34 ± 1.47	44.04 ± 1.54

Table 2. Proportion of average carcass weights and weights of the parts in mechanical cut up (%).

Groups (g)	n	Whole (g) X ± sx	Wing (%) X ± sx	Leg (%) X ± sx	Breast (%) X ± sx
≤ 1450	36	1393.67 ± 27.45	11.74 ± 1.07	44.72 ± 1.54	45.53 ± 1.58
1451-1550	29	1504.14 ± 27.35	11.59 ± 0.70	44.34 ± 2.35	44.07 ± 2.38
1551-1650	37	1616.35 ± 25.34	11.19 ± 0.73	43.70 ± 1.35	45.11 ± 1.63
1651-1750	35	1682.74 ± 24.68	11.09 ± 0.89	43.45 ± 1.50	45.46 ± 1.68
1751-1850	33	1793.45 ± 26.39	11.44 ± 0.89	44.51 ± 1.82	44.05 ± 2.12
1850 <	43	2065.07 ± 134.77	11.63 ± 0.61	44.57 ± 1.98	43.80 ± 1.91
General	213	1692.37 ± 234.35	11.45 ± 0.85	44.22 ± 1.81	44.67 ± 1.99

Table 3. The percentage of shares from pieces within total the income in manual cut up (%).

Groups (g)	n	Wing X ± sx	Leg X ± sx	Breast X ± sx
≤ 1450	44	21.30 ± 0.89	38.93 ± 1.23	39.77 ± 1.61
1451-1550	58	21.48 ± 0.83	38.55 ± 1.58	39.97 ± 1.56
1551-1650	48	21.24 ± 0.99	38.89 ± 1.31	39.87 ± 1.31
1651-1750	53	21.14 ± 0.77	38.48 ± 1.38	40.38 ± 1.51
1751-1850	48	21.06 ± 0.84	38.68 ± 0.95	40.25 ± 1.22
1850 <	57	20.92 ± 0.75	39.25 ± 1.24	39.83 ± 1.43
General	308	21.19 ± 0.87	38.80 ± 1.33	40.01 ± 1.46

Table 4. The percentage of shares from pieces within the total income in mechanical cut up (%).

Groups (g)	n	Wing X ± sx	Leg X ± sx	Breast X ± sx
≤ 1450	36	21.28 ± 1.72	39.13 ± 1.52	39.59 ± 1.61
1451-1550	29	21.03 ± 1.13	38.85 ± 2.13	40.12 ± 2.20
1551-1650	37	20.33 ± 1.21	38.47 ± 1.20	41.20 ± 1.65
1651-1750	35	20.25 ± 1.47	38.22 ± 1.39	41.53 ± 1.70
1751-1850	33	20.85 ± 1.45	39.08 ± 1.61	40.07 ± 2.10
1850 <	43	21.13 ± 0.98	39.00 ± 1.82	39.88 ± 1.73
General	213	20.81 ± 1.38	38.79 ± 1.64	40.40 ± 1.94

Table 5. Results of manual cutting up shrinkage.

Groups (g)	Shrinkage (g) X ± sx	Shrinkage (%) X ± sx	Index ¹
≤ 1450	3.74 ± 3.97	0.27 ± 0.29	64.29
1451-1550	4.43 ± 2.93	0.29 ± 0.19	69.05
1551-1650	7.28 ± 4.43	0.45 ± 0.27	107.14
1651-1750	8.18 ± 3.83	0.48 ± 0.22	114.29
1751-1850	8.53 ± 1.90	0.48 ± 0.10	114.29
1850 <	11.29 ± 4.15	0.55 ± 0.19	130.95
General	7.33 ± 4.44	0.42 ± 0.24	100

¹ Index: 0.42 = 100

Table 6. Results of mechanical cutting up shrinkage.

Groups (g)	Shrinkage (g) X ± sx	Shrinkage (%) X ± sx	Index ¹
≤ 1450	13.03 ± 6.07	0.94 ± 0.44	80.34
1451-1550	15.38 ± 12.17	1.02 ± 0.81	87.18
1551-1650	17.97 ± 10.26	1.11 ± 0.64	94.87
1651-1750	20.11 ± 10.61	1.19 ± 0.62	101.71
1751-1850	23.79 ± 12.98	1.33 ± 0.72	113.68
1850 <	28.09 ± 14.56	1.36 ± 0.68	116.24
General	20.08 ± 12.51	1.17 ± 0.67	100

¹ Index: 1.17 = 100

Table 7. Results of gross and net income difference in manual cut up.

Groups (g)	Gross Income Difference (%) X ± sx	Gross Income Difference (%) X ± sx	Net Income Index ¹
≤ 1450	14.88 ± 0.67	14.10 ± 0.86	102.57
1451-1550	14.96 ± 0.60	14.19 ± 0.70	103.17
1551-1650	14.64 ± 0.75	13.74 ± 0.92	99.94
1651-1750	14.49 ± 0.55	13.59 ± 0.68	98.86
1751-1850	14.42 ± 0.56	13.55 ± 0.60	98.52
1850 <	14.22 ± 0.52	13.32 ± 0.61	96.88
General	14.60 ± 0.66	13.75 ± 0.79	100.00

¹ Index: 13.75 = 100

Table 8. Results of gross and net income difference in mechanical cut up.

Groups (g)	Gross Income Difference (%) X ± sx	Gross Income Difference (%) X ± sx	Net Income Index ¹
≤ 1450	14.13 ± 1.37	11.95 ± 1.69	105.08
1451-1550	13.88 ± 1.32	11.70 ± 2.05	102.93
1551-1650	13.39 ± 0.98	11.20 ± 1.49	98.47
1651-1750	13.21 ± 1.16	10.98 ± 1.61	96.56
1751-1850	13.38 ± 1.37	11.08 ± 1.97	97.47
1850 <	13.53 ± 0.88	11.33 ± 1.43	99.65
General	13.59 ± 1.21	11.37 ± 1.71	100.00

¹ Index: 11.37 = 100

Discussion

Based on the time measurements carried out throughout this study, it was found that the process of cutting up lasts 12 s by hand and 50.5 s with machine.

When the findings concerning the proportion of part weights are examined (Tables 1 and 2), it is observed that legs occupy the largest share of the total weight in manual cutting up while in mechanical cutting up breast occupies the largest share, which results from the particular style of mechanical cutting up. The Figure displays the manual and mechanical cutting up styles. While mechanical cutting up follows

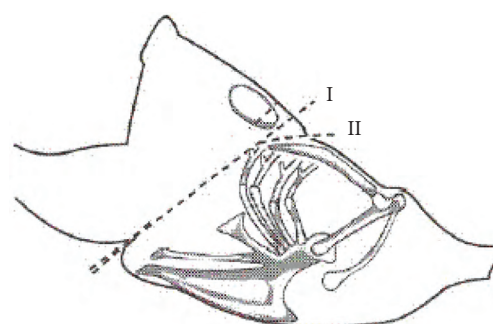


Figure. Carcass cutting up styles.

line I, manual cutting up follows line II. In general, the findings pertaining to percentile distribution of weights of the parts comply with the literature (10,11).

When the proportional distribution of parts incomes (Tables 3 and 4) is examined, breast appears in the first row for both cutting up styles as its price is higher. For mechanical cutting up, the percentage of the incomes obtained from breast has higher values based on the sales price and the rate of weight.

As shown in Tables 5 and 6, which display average shrinkage findings that occur as a result of the cutting up processes, mechanical cutting up causes more shrinkage compared to manual cutting up. This situation can be explained with the increasing shrinkage that takes place in the period of time passing from the mechanical cutting up of the carcasses to the weighing process.

When the shrinkage index findings, which are based on the general shrinkage rate, are examined, it is observed that for carcasses of 1851 g and above, manual cutting up results in 31% more shrinkage and mechanical cutting up results in 16% more shrinkage compared to the average values.

As a result of the manual cutting up process (Table 7), a gross increase of 14.60% is calculated to occur in sales incomes. The increase in net income calculated through the subtraction of loss and labor expenses from gross increase in incomes is determined as 13.75%.

As a result of the mechanical cutting up process (Table 8), a gross increase of 13.59% is calculated to occur in sales revenues, while the net increase in revenues reaches up to the average value of 11.37%.

In a study carried out by Cevger et al. (1), it was determined that, with summertime rates, the net increase in incomes has occurred for manual cutting

up by 13.82% and for mechanical cutting up by 15.61%.

When the findings obtained were compared to those of Cevger et al. (1), it was observed that the rates of increase in net incomes were similar yet in opposite directions. In our study, we observed that manual cutting up might lead to greater increases in incomes compared to mechanical cutting up. It might be stated that the greater increase in net incomes due to mechanical cutting up observed in the study carried out by Cevger et al. (1) stems from labor force productivity; that is, the differences in labor force expenses per unit. Indeed, Cevger et al. (1) determined that a worker cuts up a carcass using a knife in about 60 s while mechanical cutting up takes 17 s to be ready for packing. In our study, it was determined that a worker cuts up a carcass in 12 s using a knife whereas mechanical cutting up takes 50.5 s. Based on these data, it might be concluded that selling the broiler carcass cut up brings along greater increase in enterprise income compared to selling as a whole.

In our study we observed a smaller net income increase rate for mechanical cutting up compared to manual cutting up because mechanical cutting up causes more shrinkage. However, the rate of shrinkage diminishes when the parts are packed immediately after the cutting up process. Moreover, it should be noted that all day manual cutting up may lead to a decrease in labor force productivity, which may result in an increase in the costs.

Consequently, as observed in the net income indexes given in Tables 7 and 8, for carcasses of 1550 g and below, manual and mechanical cutting up brings about an increase in the net income above average. Based on this result, which varies with the method chosen, cut up marketing of carcasses with net income indexes above 100 would be a more rational decision for the good of the enterprise.

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