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Proximate Composition of Meat and Dressing Losses of Wild and Farmed *Labeo rohita* (Rohu)

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Abstract.- Proximate composition of meat and dressing losses of wild and farmed *Labeo rohita* of three different weight categories were determined. The farmed raised *Labeo rohita* of three different weight categories designated as F_1 (500-800 g), F_2 (900-1200 g) and F_3 (1300-1600 g), were procured from Fish Hatchery, at Satiana Road, Faisalabad. Concurrently, wild *Labeo rohita* of three different weight categories designated as W_1 (500-800 g), W_2 (900-1200 g) and W_3 (1300-1600 g) were captured with the help of gill nets from the Trimu Head, which is about 95 Km away from Faisalabad. The farmed *Labeo rohita* showed contents of protein (20.68±0.02%), lipids (4.14±0.04%) and ash (1.23±0.02%). The maximum moisture and carbohydrate contents were estimated as 77.56% and 4.63%, respectively in wild *Labeo rohita*. The maximum dressing losses were recorded as 29.25% in wild *Labeo rohita* under W_3 (1300-1600 g). Farmed *Labeo rohita* is found to be best due to its nutritional as well as commercial value as compared to that of wild fish.

Key words: Proximate composition, dressing losses, fish meat, farmed fish, *Labeo rohita*.

INTRODUCTION

Fish farming and aquaculture industry play a significant role in contributing the fish protein to a large human population (Ravenhalt, 1982). Hoffman *et al*. (1993) percentage yield and fillets chemical composition of wild and farmed male and female African sharptooth catfish *Clarias gariepinus*. Farmed males yielded 26.7% fish fillets as compared to 44.7% for wild males, 44.2% for wild females and 38.9% for farmed females. Fish body composition appeared to be largely influenced by feed composition and also increase in other parameters such as feed ratio and fish size also resulted in enhanced adipose deposition and decreased in water contents in the fish body (Rasmussen, 2001). Mahboob *et al*. (1996) reported that proximate composition of six fish species under different fertilization schemes. They found that flesh of all six fish species depicted overall highest protein contents (60.72%) and in fish from broiler manure fertilization, *Labeo rohita* showed the best performance (60.75%) in terms of accumulating protein in body. The maximum fat and ash contents were recorded in *Cyprinus carpio* and correlation coefficient between total fat and total protein was highly significant and positive. *Labeo rohita* is one of the indigenous fish species of the region, which is most commonly cultured in all types of the freshwater bodies. This fish is popular among consumers due to its taste and nutritional value. The present study was, undertaken to compare proximate composition of meat and dressing losses of wild and farmed *Labeo rohita.*

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MATERIAL AND METHODS

Freshwater carp, *Labeo rohita* of three different weight categories, both farmed and wild were analyzed for the estimation of proximate composition of meat and dressing losses. The farmed raised *Labeo rohita* of three different weight categories designated as F_1 (500-800 g), F_2 (900-1200 g) and F_3 (1300-1600 g), were procured from Fish Hatchery, at Satiana Road, Faisalabad. Concurrently, wild *Labeo rohita* of three different weight categories designated as W_1 (500-800 g), W_2 (900-1200 g) and W_3 (1300-1600 g) were captured with the help of gill nets from the Trimu Head, which is about 95 Km away from Faisalabad. The farmed *Labeo rohita* were fed on a commercial diet (35% crude protein), whilst the wild *Labeo rohita* diet evidently consisted mainly of crustaceans,

insects, phytoplankton and some insect larvae.

Fish were transported live to the Fisheries Research Laboratory, Department of Zoology, Government College University, Faisalabad. All the fish specimens were freshened out in running dechlorinated tap water for two days, thereby facilitating the emptying and removal of stomach contents. Fish were, then, slaughtered and dressed which consisted of removing the visceral organ, scales and fins followed by filleting.

Chemical analysis

Meat was minced and freeze-dried at –30°C. A freshly minced sample was immediately oven dried (60°C) for 24 hors to determine moisture contents (AOAC, 1984). Thus the sample was ignited in a furnace at 600°C for the determination. The freeze-dried samples were analyzed for nitrogen (protein= n × 6.25) and total fat (AOAC, 1984). Dressing losses were also worked out as dressing percentage of body weight. The data obtained was subjected to statistical analysis by using MINITAB computer program to know the significance among the various parameters.

RESULTS AND DISCUSSION

Proximate composition of meat

In the present study, the farmed *Labeo rohita* of the weight category F_2, showed the highest total protein contents (20.68%), closely followed by F_3 (Table I). While, minimum protein contents were found in wild *Labeo rohita* under W_1. Lipids are generally regarded as the most important constituents, which determines the quality of fish meat (Caulton and Brusell, 1977; Love, 1988). In the present experiment, lipid contents varied from 1.30±1.94 and 2.32±4.14% in wild and farmed *Labeo rohita*, respectively. The maximum lipid contents (4.14%) were recorded in farmed *Labeo rohita* under F_3. The marked difference in the protein and lipid contents of wild fish seems to be due to scarcity of food, and weight and size of the fish. This state of scarcity resulted in the decreased growth of fish due to long period of restricted food supply to fish. Fish showed progressive reduction in fat reserves, yet before reaching a critical low level proteins began to be utilized for energetic purpose, and ultimately a reduction in their protein contents with increased water contents was resulted (Mahboob, 1992; Hassan, 1996). According to Love (1980) the fish at first consumes lipids from liver and starts to mobilize muscle protein only when fat derived energy has been nearly used up. After that, as protein is utilized, water moves into take its place. Such a shift resulted in the increased water contents that were inversely correlated with protein and fat reserves of their meats (Shimma and Sato, 1985; Mahboob and Sheri, 1997).

The higher protein contents of farmed fish of the weight group F_2 were likely due to the better food consumption and its conversion into protein in the fish flesh, while, in wild fish the higher protein contents remained in the weight category W_3 (17.76%). Srikanth *et al.* (1989) reported that in *Cyprinus carpio*, the moisture content was lowest and protein deposition highest under the influence of a fertilizer treatment with high protein and low protein contents. Shimma (1986) mentioned that differences of protein and moisture were not significant in the two races of Yamato and Mirror carp, *Cyprinus carpio* fed at similar level of commercial feed. Jayaram and Shetty (1980) observed that the fish *Catla catla, Labeo rohita* and *Cyprinus carpio* reared under different manuring and feeding regimens were not significantly different in their chemical composition. Hoffman *et al*. (1993) mentioned that fillet chemical composition of farmed *Clarias gariepinus* is better than that of wild fish. The present results contradict the findings of Shimma (1986), Jayaram and Shetty (1980) but are in line with results recorded by Srikanth *et al*. (1989) and Hoffman *et al*. (1993). In farmed fish there was decrease in protein content with an increase in body weight. It was interesting to note in the present study that the fat contents were also remained highest in the farmed fish as compared to wild *Labeo rohita*, which was probably due to less effort by the farmed fish to get the food and high intake food.

The relationships among various constituents of proximate composition of wild and farmed *Labeo rohita* worked out and presented in Table III. Correlation coefficient values among moisture and protein remained negative, so they were inversely correlated. But their relationship was highly

Table I.- Comparison of proximate composition of meat of wild and farmed *Labeo rohita*.

Type of fish	Weight category	Moisture (%)	Protein (%)	Lipid (%)	Carbohydrates (NFE) (%)	Ash (%)
Wild fish	500-800 g	77.56±0.07^{*a}	16.62±0.03^{e}	1.94±0.04^{d}	3.29±0.09^{d}	0.58±0.02
	900-1200 g	76.37±0.08^{b}	17.58±0.02^{d}	1.61±0.03^{e}	3.77±0.08^{b}	0.66±0.02
	1300-1600 g	75.50±0.08^{c}	17.76±0.02^{c}	1.30±0.02^{f}	4.63±0.08^{a}	0.80±0.03
Farmed fish	500-800 g	75.40±0.10^{c}	17.81±0.03^{c}	2.32±0.02^{c}	3.46±0.04^{cd}	1.01±0.01
	900-1200 g	72.86±0.04^{d}	20.68±0.02^{a}	3.73±0.03^{b}	1.60±0.02^{e}	1.13±0.1
	1300-1600 g	71.68±0.07^{e}	19.38±0.02^{b}	4.14±0.04^{a}	3.57±0.05^{c}	1.23±0.02

*Mean±SD: Means within column with different letters differ significantly (P>0.05).

Table II.- Average losses in finished fish meat, percentage of visceral and external weights with live body weight in wild and farmed *Labeo rohita* under three weight categories.

Type of fish	Weight category	Average live weight (g)	Average dressed weight (g)	Average visceral % of average live body weight	Average external loss % of average live body weight	Average fresh fish total loss (g)	% Loss
Wild fish	500-800 g	619.28±0.09	466.44±0.65	9.94±0.25	14.74±1.12	152.84±0.88	24.68±1.22
	900-1200 g	1041.43±0.07	756.28±1.30	11.25±0.67	16.13±1.34	285.14±1.66	27.38±1.56
	1300-1600 g	1460.65±1.20	1031.47±1.96	11.58±0.79	17.77±1.06	428.53±1.70	29.35±1.90
Farmed fish	500-800 g	619.28±1.04	459.73±1.12	9.61±0.45	16.15±0.099	159.56±1.90	25.76±1.06
	900-1200 g	1041.43±1.78	763.26±0.88	9.79±0.88	16.92±1.11	278.17±1.32	26.71±1.33
	1300-1600 g	1460.88±2.23	1044.21±.05	12.67±1.05	15.81±0.95	415.78±1.44	28.48±1.71

Table III.- Relationship among various constituents of proximate composition of meat in wild and farmed *Labeo rohita*.

	Protein	Fat	Ash	Carbohydrate
Moisture	-0.89**	-0.89**	-0.94**	0.37^{NS}
Protein	-	0.82**	0.84*	-0.67^{NS}
Fat	-	-	0.86*	-0.64^{NS}
Ash	-	-	-	-0.4^{NS}

*Significant (P<0.05); NS = Non-significant (P>0.05).
**Highly significant (P<0.01)

Table IV.- Relationship of dressed fish weight and various dressing losses with total fish weight of wild and farmed *Labeo rohita*.

	Wild fish				Farmed fish			
	Dressed fish weight	Visceral organs loss	External loss	Total fish loss	Dressed fish weight	Visceral organs loss	External loss	Total fish loss
Total weight	0.999	0.998	0.997	0.999	0.999	0.980	0.991	0.998
Dressed fish	-	0.998	0.996	0.998	-	0.977	0.991	0.997
Visceral organs loss	-	-	0.993	0.997	-	-	0.950	0.986
External loss	-	-	-	0.999	-	-	-	0.988

significant. Similar findings were observed in case of correlation among lipid, ash and moisture. Whereas, correlation coefficient values of carbohydrate (NFE) with moisture remained positive and non-significant. There were also an inverse correlation between carbohydrate and other proximate composition *viz*., protein, lipid and ash. These results are substantiated by the findings of the Al-Asgha (1992) and Mahboob (1992). Love (1980) mentioned that moisture contents showed an inverse relationship with lipids in the meat of fatty fish and with the protein in non-fatty fish. The results of present study corroborate the findings of the above-mentioned worker.

Dressing losses

The average total losses (Table II) during the dressing of fish were corresponded directly to their live body weight. Dressing percentage was always highest for wild *Labeo rohita* under W_3 closely followed by farmed *Labeo rohita* under F_3. This was due to higher weights of external losses in wild fish as compared to other weight categories of wild and farmed fish. This could be due to the genetic function of the fish as described by Mahboob and Sheri (2002). Bondari (1980) and Smitherman *et al*. (1983) were of the view that this is a physiological activity rather than a genetic function of the fish.

Viscera percentage was always maximum in the farmed fish under F_3 (12.67%) followed by W_3 (11.58%) which increased with body weight in the wild and farmed fish (Table II). The Viscera percentage seemed to be a major variable that explained the dressing percentage. Raza and Mahboob (2000) also reported the similar findings. The relationships of various dressing losses, and dressed fish weight with total fish weight of wild and farmed *Labeo rohita* were worked out and presented in Table IV. There existed highly significant and positive correlations between various dressing losses, dressed fish weight and total fish weight of wild and farmed *Labeo rohita*.

The results of the present study regarding the estimation of chemical components and dressing losses of wild and farmed *Labeo rohita* revealed that farmed fish has more nutritional and commercial value than wild *Labeo rohita*.

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