STUDY OF A TRADITIONAL DRY BEEF MEAT PRODUCT: "UŽIČKA PRŠUTA"- PROCESSING, QUANTITATIVE AND QUALITATIVE CHARACTERISTICS

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SUMMARY: The object of our study was "UŽIČKA PRŠUTA", shelfstable fermented product made of beef meat, processed using traditional technology in region of mountain Zlatibor, Yugoslavia. Besides technology (forming of muscle, salting, drying, smoking),that lasts approximately 30 days, on samples of muscle that have formed like "UŽIČKA PRŠUTA" (two samples from round and one from loin) data were established for dehydration, gain, also main shemical and organoleptical data of final product. Weight loss during processing is 40-50%, product has specific organoleptical characteristics, content of water is 40-45% and 4,5 to 5% of NaCl (salt).

INTRODUCTION: Preserving meat in parts through combined salting, drying and smoking has very long tradition. Already acquired experiences and processing used in various parts of the world, or even within regions in some countries, regarding type of muscle that are used, type of muscle preparation, composition and quantity of salt, conditions and duration of salting, drying and smoking, influenced appearence of numerous specific products: South American - "SHARAQUI", North American - "PEMMICAN" and "JERKY", Central American-"TASAJO" (Andjuar and Valladares, 1989); South African - "BILTONG" (Van der Riet, 1982); Central European - "BINDENFLEISCH" (Souci et al., 1968; Hess et al., 1976). Production of similar shelf-stable product ("PRŠUTA") of beef, pork and mutton has long and rich tradition in Yugoslavia (Savić T.and Nada Savić, 1962; Joksimović et al., 1985), especially on the mountain Zlatibor (western Serbia). This type of processing is seasonal (November-February) and it is additional

activity for farmers households, but it is also part of manufacturing program of export slaughterhouse "Zlatibor" situated in a small mountain town Čajetina. Having in mind that traditional products in this area are not enough examined and that in the structure of these high quality and in Yugoslavia widely appereciated and demanded products the greatest part has beef "UŽIČKA PRŠUTA" (about 40%), we decided to aim our study on that product.

MATERIALS AND METHODS: As raw material for production of beef "UŽIČKA PRŠUTA", the most valuable parts of carcass muscles are used, origined from well feed catle aged 3 - 5 years: r o u n d (hind shank off), l o i n (from caudal edge of 4 th thorac vertebra to tuber coxae) and t e n d e r l o i n. After debonning and detail cleaning of superficial fat and connective tissues, muscles are shaped in to pieces with lenght of 30-50 cm, width 12-15 cm and tickness 8-10 cm. Loin muscles, just occasionaly and only with transversal cuts, are separated in 2 - 3 parts, while tenderloin is used as a integral part. Shaped muscles are salted with pure salt - NaCl (without nitrats, sugar or spices) - rubbing about 3% of salt on meat weight, and then arranged in 3 - 5 rows in plastic containers. Salting is done at temperature about 5°C, 5 - 7 days. During salting meat juice is single out so that after 3 or 4 days almost whole quantity of meat is covered with this juice. In the occasions when singling is lesser, parts of meat are 2 - 3 times rearranged so that drying of upper parts, that are not in meat juice, is prevented. After salting, meat parts are hanged on sticks and placed in a room with good air circulation of where first they leak (2 - 3 h), and then drying and smoking is done. The sticks with hanging parts of meat are arranged in 3 - 5 lines (depending on the height of the room), whereas the distance of the first line is 200 to 250 cm from the heat and smoke source. As a heat and smoke source about five regularly arranged fireboxes are used and only hard types of wood are used. Temperature schould be 8-10°C (max. 12°C),relative

humidity 70-75 %. Since processing of beef "UŽIČKA PRŠUTA" is in the winter period (November-February) mentioned temperatures are obtained by occasional heating. Anyhow, process of drying and smoking lasts 3 - 4 weeks and in that period stiks with meat are 2 - 3 times rearranged (lower lines are put up and opposite) so that all quantities of meat has similar treatment.

For our study we used three samples of cleaned and shaped muscles: "RAMSTEK" (m.longissimus thoracis et lumborum-average weight was 7,460 kg), "FRIKANDO" (m. semitendinosus-average weight was 2,990 kg) and "ŠOL" (m.gracilis with part of m.semimembranosus - average weight was 2,300 kg). During processing (7 days salting, 21 days drying and smoking) dehydration was followed, and in a raw samples and final products water, fat and crude protein content (N x 6,25) was examined (Karan-Djurdjić Sonja, 1968). In final products content of NaCl also was determined (Karan-Djurdjić Sonja, 1968). In sample of "RAMSTEK" (raw and final product) content of amino-acids (Beckman-120 C) and fatty-acids (gas chromatograph VARIAN -1400 with FID detector) was examined, and results are represented in grams on 100 g of protein or fat. Content of tryptophan was determined using method described by Krilova and Ljaskovskaja, 1965 (hydrolisis was done with alkaline and intensity of blue color was measured with spectrophotometer SPEKOL - M 705110).

Organoleptical quality of final products was done by five member evaluation board.

Average monthly data of main climate characteristics (t^{o} of air and relative himidity of air), determined on mountain Zlatibor in last 40 years, were obtained from meteorologic station on Zlatibor. These data were obtained because they are factors that importly determine natural conditions in which processing of beef "UŽIČKA PRŠUTA" is done.

RESULTS AND DISCUSSION: Dynamics of dehydration, refered to data of weight loss of examined samples in observed phases

of processing of beef "UŽIČKA PRŠUTA", are represented in Figure 1. For all examined samples and all time intervals, in observed phases of processing, very similar tendencies are noticed regarding dynamics of dehydration. Weight loss is intensive during salting, especially in first week of drying and smoking (7 th - 14 th day), while dynamics of dehydration is less expressed in last two weeks of process (14 th - 28 th day).

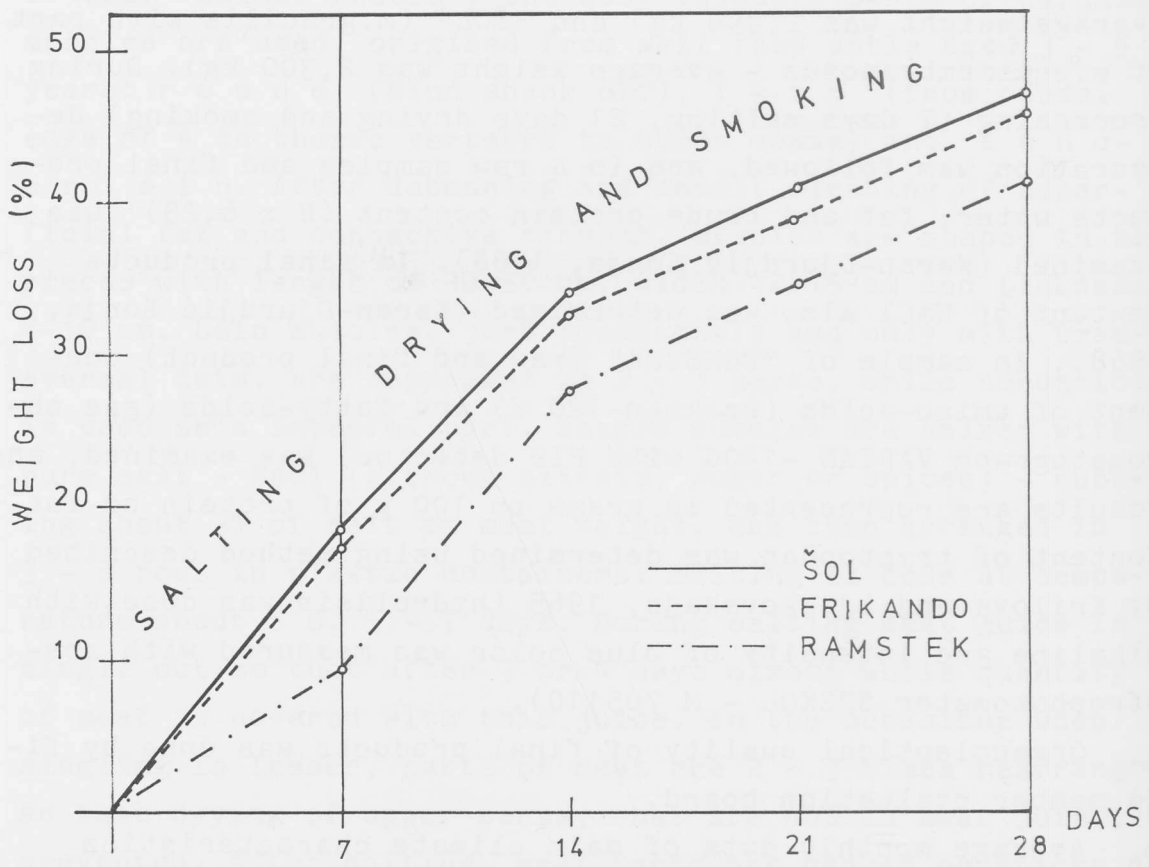

Figure 1.- Beef "UŽIČKA PRŠUTA" - average weight loss during processing time

Some differences in examined samples could be notified in the aspect of dehydration degree during all phases and time intervals of processing. That is, in our oppinion, result of diffe-

rences in the average weight of raw samples. Namely, the smaller average weight of raw samples, the higher weight loss was during particular phases of processing. So, the highest average weight loss was established at the end of process for"ŠOL" (47,39 %), whose average weight of raw samples was the smallest - 2,300 kg. Lower weight loss (45,98 %) had a somewhat heavier "FRIKANDO" (2,990 kg), while for "RAMSTEK" with the greatest average weight of raw samples (7,460 kg) the lowest average weight loss at the end of process was established - 41,78%.

Results of paralel chemical analysis of examined samples (of raw meat and corresponding final product) are showed in the Table 1. As it is presented, average water content in the final products is staying in relatively small range from about 48 to about 50 %, content of salt about 4,5 %. We emphesized that all analysis were performed immidiately after processing (28 th day) which caused some greater water content,

Table 1.- Results of chemical analysis (samples of raw meat and final product - beef "UŽIČKA PRŠUTA")

	Sample	"FRIKANDO" (n=20)		"ŠOL" (n=20)		"RAMSTEK" (n=20)	
		$\bar{x}$	Sd	$\bar{x}$	Sd	$\bar{x}$	Sd
Moisture (%)	raw sample	70,28	2,10	71,63	2,18	70,22	2,91
	final prod.	48,45	3,25	49,12	3,57	49,79	3,29
Protein (%)	raw sample	20,97	0,52	22,17	1,22	20,71	0,76
	final prod.	37,94	2,15	38,58	2,46	35,32	1,79
Fat (%)	raw sample	6,84	0,27	4,91	0,23	7,31	0,36
	rinal prod.	7,33	0,42	5,81	0,35	9,07	0,75
NaCl (%)	final prod.	4,65	0,27	4,85	0,22	4,45	0,22

in regard to smaller content of salt, from what is their usual participation in the finaly consumed product. Namely, during

storage and distribution of final products, content of water in beef "UŽIČKA PRŠUTA" decreases to optimal level of about 40 - 45%, while the content of salt increases to about 5 %. Otherwise, in the conditions of our ecperiment, values of variation coefficient for all examined indicators are relatively small and they are within range from 3 to 6 %. On such equalized series of data homogeniously chosen samples and controled conditions of processing influenced that certianly, which in industrial processing and particulary on individual households is not always possible - so that variations are certainly greater.

Data about the content of amino-acids and fatty_acids, established in the sample of raw "RAMSTEK" and in corresponding sample of final product, are presented just as additional ilustration of quality and nutritive value of beef "UŽIČKA PRŠUTA" (Table 2).

Regarding organoleptical quality indicators, on the basis of summary opinion of five member evaluation board and existing opinion of consumers, it can be said that beef "UŽIČKA PRŠUTA" has very favourable, as well as specific, organoleptical characteristics. Product has moderately firm consistency and brown-red colour on the surface. On the cross section, muscle tissue is red and regularly pecked with small amount of fat tissue. Also, it has pleasant smell and taste, characteristical for salted, dryed and smoked beef meat and has specific and very pleasant aroma.

Finaly, at the end of these discussion, we would like to emphasize that in the region of the mountain Zlatibor in Yugoslavia there are exceptionaly favorable climate conditions for production of shelf-stable meat products, consequently for beef "UŽIČKA PRŠUTA" also. In winter period, when those products are processed (November-February), in the last 40 years average temperature of air was from +3,5 to -2,2°C, and relative humidity of air was from 81 to 85%; more intensive air movements were not registered. Thanks to that type

of climate rooms on individual households (in which by moderate heating and production of cold smoke temperatures from 8 to 10°C are obtained and relative humidity from 70 to 75 %)

Table 2.- Amino acid and fatty acid composit. of beef "UŽIČKA PRŠUTA" ("RAMSTEK" sample-raw and final product)

Amino acid (g/100g protein)	"R A M S T E K" raw sample	final product	Fatty acid (g/100 g fat)	"R A M S T E K" raw sample	final product
Tryptophan	2,185	2,230	Saturated,		
Threonine	3,908	4,634	total	43,08	48,51
Isoleucine	2,983	4,778	10:0	0,02	0,05
Leucine	8,151	8,543	12:0	0,03	0,07
Lysine	8,739	8,572	14:0	1,64	3,01
Methionine	3,572	2,752	15:0	0,34	0,52
Cystine	0,798	0,724	16:0	21,83	23,87
Phenylalanine	3,193	4,344	17:0	0,61	0,58
Tyrosine	3,529	3,475	18:0	18,31	20,28
Valine	3,992	4,112	20:0	0,30	0,13
Arginine	5,924	4,634	Monounsatur-		
Histidine	2,732	2,635	ated, total	54,82	47,46
Alanine	7,059	7,240	14:1	0,74	0,96
Aspartic acid	9,748	9,007	15:1	0,13	0,17
Glutamic acid	20,126	19,230	16:1	2,18	2,36
Glycine	5,336	5,010	17:1	0,20	0,42
Proline	3,655	3,186	18:1	51,57	43,55
Serine	4,370	4,894	20:1	-	-
% Protein			Polyunsatur-		
(N x 6,25)	20,64	35,18	ated, total	1,60	3,42
			18:2	1,27	2,92
			18:3	0,23	0,33
			20:4	0,10	0,17
			Total lipids		
			(%)	7,25	9,12

are natural "climate-chembers" for drying, smoking and ageing of products.

CONCLUSIONNS: Based on our study and many years of experience, acquired in industry and in farmers households, we emphasize following conclusions:

Beef "UŽIČKA PRŠUTA" is shelf-stable fermented product from beef meat, that is produced according to traditional technology in region of mountain Zlatibor in Yugoslavia from most valuable parts of beef carcass (round; loin; tenderloin). Processing lasts for approximately four weeks (7 days saltig, 21 days drying and smoking) and in that period weight loss of procesed parts of meat (dimensions 30-50 cm x 12-15 cm x 8 -10 cm) is 40-50%. Final product has extraordinary favourable organoleptical characteristics, water content from 40 to 45% and salt (NaCl) about 5 %.

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