WATER- AND FAT- HOLDING IN GROUND MEAT SYSTEMS AS INFLUENCED BY THE DIFFERENT VEGETABLE

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INTRODUCTION

Meat products made traditionally are high in fat and need significant improvement according the increased demand of reduced-fat items. The removing of fat and using of functional ingredients as proteins, carbohydrates play a key role in the development of new reduced - fat meat products (Ketton 1991, Colmenero 1996). Dietary recommendations noted necessary of increased consumption of foods high in fibers, vitamins and minerals, also.

The high nutritive value and protective benefits of vegetable and fiber isolates in the diet have largely been proven (Johnson & Southgate 1994, Huffman et al. 1991) and different food is developed. However there is a lack of information about vegetable functionality in meat systems.

MATERIAL AND METHODS

Functionality of dried vegetables. Parsley *(Petroselinum crispum Nym.)*, parsnip *(Pastinaca sativa L.)*, leek *(Allium porum L.)*, celery *(Apium graveoleus L.)* and topinambur *(Helianthus tuberosium L.)* were collected from Lithuanian Institute of Horticulture. The roots were cleaned, washed, ground and dried at ambient temperature with an activated ventilation. Dried material was milled till the particle size 1 mm and stored in bags until analysis. Determination of water and fat imbibing were released by centrifugation (5 min. at 3200 rpm) of mixture of 2 g of dried vegetables and 15 ml water or vegetable oil. The imbibed liquid expressed as a percentage of the original weight of dried vegetables.

Effect of vegetables on water- and fat-holding of ground meat systems. Fresh beef cuts from the shoulder, pork back fat were obtained from Meat Makers Association Training Center (Kaunas), three days after slaughter. Beef muscle was trimmed- off separable fat. The meat and fat were ground separately through a 3 mm grinder plate. Before manufacture of patties dried vegetables were hydrated for approx. 30 min. in the next proportions: leek 1:6; celery 1:5,5; parsnip 1:4,5; parsley 1:4,5; topinambur 1:4. The content of fat (20%) and salt (1,2%) was kept constant, while the hydrated vegetables were added in different quantities. The 20% fat content was selected since this factor has been found to be one of the most important factors regarding the fat-holding of ground patties (Tornberg *et al.*, 1989). The net test was used to determine the water- and fat-holding properties of the ground patties by heating samples (n=8) in the tubes in a water bath at 77°C for 35 min. The samples were centrifuged for 20 min. at a speed of 2400 rpm after heat treatment and fat and water losses were determinate by weighting of tubes. The content of protein of raw materials and water content of all beef patties were analyzed (AOAC 1990).

RESULTS AND DISCUSSION

Water and fat imbibing are the key properties of ingredients of meat systems. It was found that the dried vegetables imbibe 4.5 to 6.5 times the own weight of water. The best water imbibing contributes to leek (620%), other vegetables bind 460 - 560% of water. The effect of leek probably is attributable to its highest content of proteins (till 17.9%). The hydratation proportion for further experiment were used according the water holding capacity of each vegetable. The fat imbibing capacities of vegetables showed their similarity (1,5 - 2 ml/g).

The results of water-holding capacity of three batches of ground beef patties (Figure 1) showed that water loss increase with added amount of hydrated vegetables (except for beef - parsley patties). The patties with 0 - 30% of hydrated parsley lost 42 - 43% of total amount of water, but these losses are not influenced by added amount of vegetable. The losses of beef patties with 10 - 25% of parsnip there are the same or even lower than of control one, also. The high water losses of patties are influenced by natural beef water loss, also. After heating all control beef - fat patties lost 38 - 46% of total water content.

The amount of fat loss of beef - vegetable patties increase with amount of vegetable added (Figure 2). However the addition of 10 - 25% of hydrated leek reduce fat losses of beef patties. Probably the better fat holding is affected by higher amount of leek proteins and/or by plant cell fragments forming physical barriers around the fat droplets (Ketton 1991).

CONCLUSION

The water- and fat- holding capacities of beef - vegetable patties are influenced as by added amount of hydrated vegetable as by properties of beef itself, also. The water- and fat-losses of beef - vegetable patties increase significant than more than 15 - 20% of hydrated vegetable are added. Due to minimize the water - and fat-losses of beef - vegetable patties there is recommended do not increase the amount of vegetable added more than 15% and stabilize meat system with protein. The lowest water loss are for beef patties with parsnip and parsley.

The addition of hydrated leek may reduce the fat losses of beef patties and, probably, other meat products.

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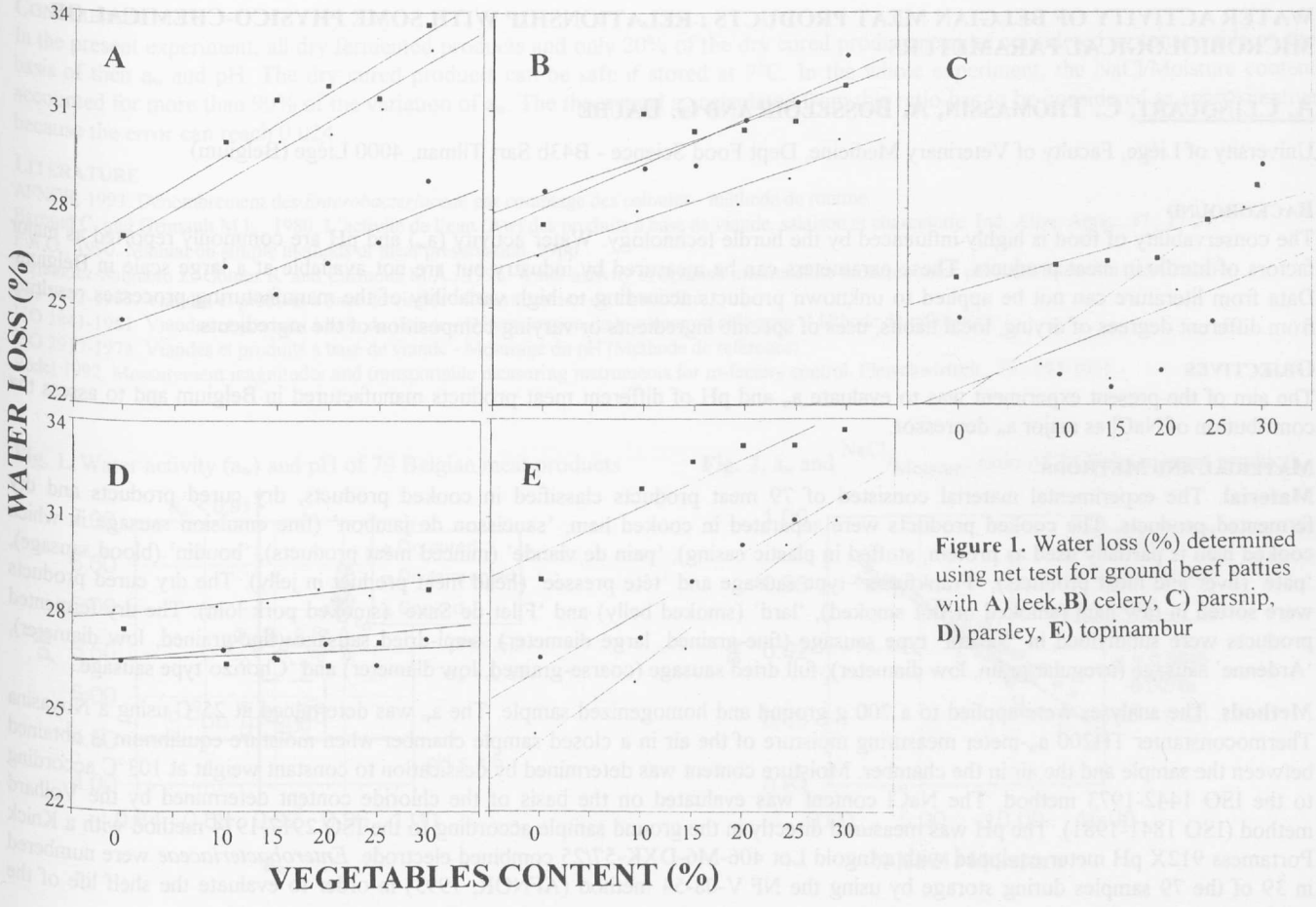

Figure 1. Water loss (%) determined using net test for ground beef patties with **A)** leek,**B)** celery, **C)** parsnip, **D)** parsley, **E)** topinambur

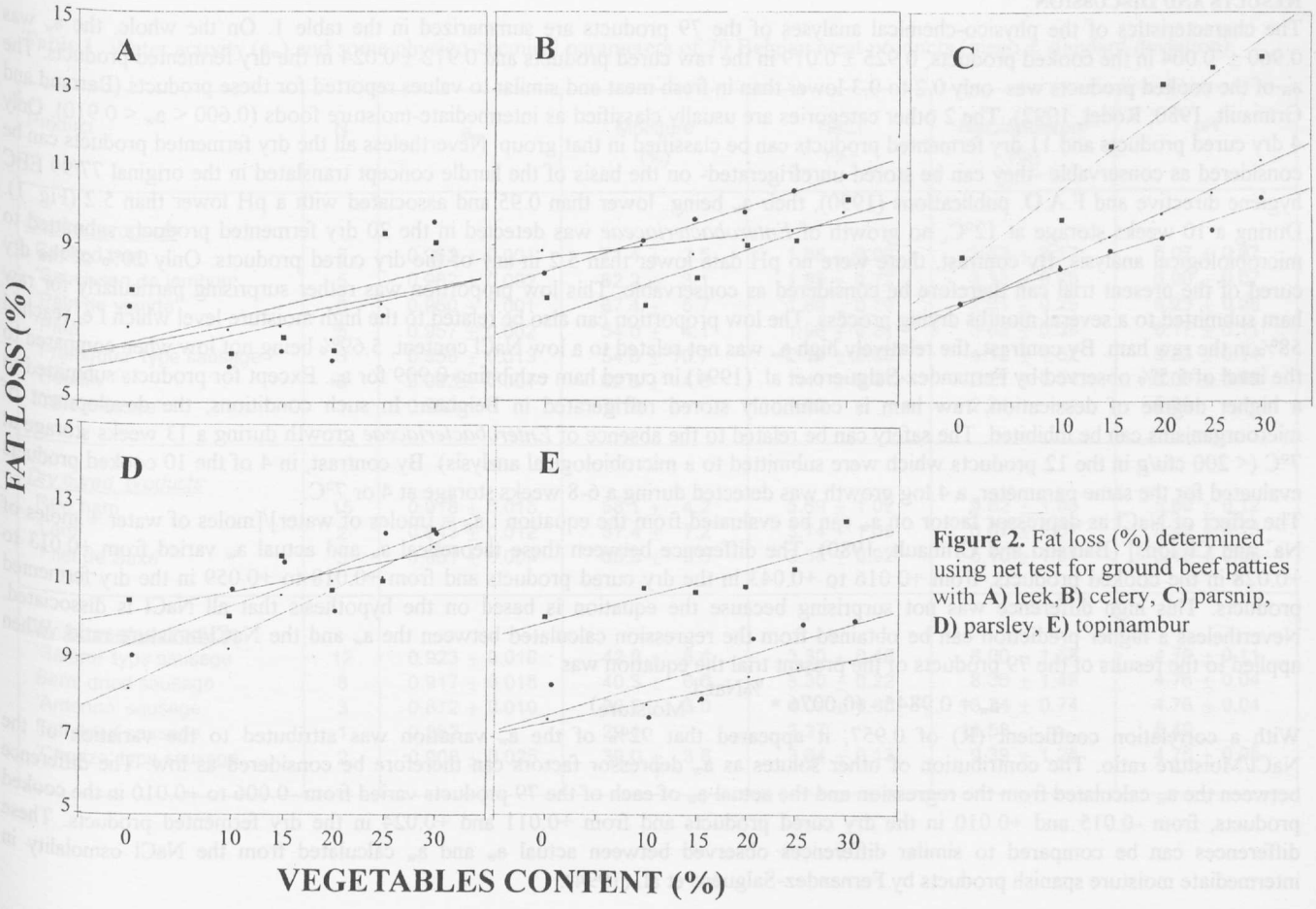

Figure 2. Fat loss (%) determined using net test for ground beef patties with **A)** leek,**B)** celery, **C)** parsnip, **D)** parsley, **E)** topinambur