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RESEARCH REPORT

Researcher works to develop low-fat, cold bound restructured lamb chop suitable for broiling

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Introduction

Consumers of meat generally look for products that are lean, palatable and convenient to prepare. Recent increases in U.S. poultry, pork and beef consumption have been attributed to the development of new products that are better portioned, easy to prepare and have unique taste characteristics. Lamb consumption in the United States, on the other hand, has been on the decline. Reasons for this include perceived poor palatability, variability in portion size and difficulty of preparation. Recognizing these problems, California sheep producers are interested in the development of lamb products that are low-fat, consistent in size and eating quality, easy to prepare, and can be competitively priced. Lamb shoulder is a low-value commodity that was used to produce such products. Lamb shoulder meat, boned and trimmed of all external and seam fat, was combined with seasoning and a commercial cold meat binding material to produce a restructured chop of uniform composition that was able to be portion-sized and cooked quickly on a broiler or grill. Finished product acceptability was evaluated via consumer taste-testing. Successful production could provide American consumers with a lamb alternative to other similarly produced meat products.

Product Preparation

The purpose of this project was to use shoulder meat and a commercial cold-set binding system to produce a restructured lamb chop that has the appearance of whole muscle, yet can be purchased raw and cooked just prior to serving.

Fibrimex, a product of F.N.A. Foods Inc., is a mixture of fibrinogen and thrombin, two natural blood constituents which when combined have an adhesive affect. This meat binding system is unique in that it does not require the use of heat, salt, phosphate nor any other additive or process to permanently join meat particles. It is approved for use by the USDA; however the label must bear a qualifying statement indicating that the product was formed with beef fibrin.

Lamb square-cut shoulders were boned and the meat separated into denuded muscle tissue and 85-percent lean, 15-percent fat trim. Denuded muscles were needle tenderized before surface coating by tumbling 30 lbs. of meat with 1000 milliliters of a 20:1 ratio mixture of fibrinogen and thrombin. No other ingredients were added. Fibrimex coated meat was stuffed into perforated plastic forming casings using a pneumatic stuffer. After stuffing, the three-inch diameter logs were held in a 35°F cooler overnight to set. Logs were then blast frozen for portioning by sawing into one-inch thick chops. Portioned chops were boxed and immediately returned to freezer storage at -15°F until defrosted for bind determination and consumer taste testing.

Ten defrosted one-inch thick chops were randomly selected and evaluated subjectively for degree of bind by manually pulling to see how easily the chop might separate during normal handling prior to cooking.

Consumer taste-testers were volunteers attending the university's spring open house. One-inch thick chops were pan broiled to a core temperature of 155-160°F by cooking in an electric skillet at 275°F for 16 minutes (eight minutes per side). Cooked chops were allowed to cool for 2-3 minutes, lightly sprinkled with table salt and diced into bite size portions. A team of four research assistants monitored the cooking, conducted sample preparation and recorded consumer responses. One hundred volunteer consumers participated in the taste test survey by eating one or two samples and answering questions relating to frequency of lamb consumption, overall taste preference and purchase interest. Specific questions asked were as follows: 1) how often do you eat lamb; 2) how do you rate the overall taste of this product; 3) would you order it from a restaurant menu if you were sure the eating experience would be equal to the taste test sample; and 4) would you buy this product in the grocery store if you were sure it would be equal in quality to the taste test sample?

Forty-eight square-cut lamb shoulders were muscle boned. Shoulders were generally quite fat and on the heavy side, averaging 9.3 lb. green weight and ranging from 7.7-10.8 lb. Hand-boning yielded an average of 20.8 percent denuded muscle meat and 24.7 percent 85-15 trim. Low-lean meat yields are attributed to a high proportion of combined internal and external fat. This low percentage of usable closely trimmed muscle could be a concern when considering the economics of using shoulder meat for restructuring.

All chops evaluated for degree of bind held together well enough to withstand normal handling, slicing and cooking preparation. Each chop was manually tugged side-to-side in an attempt to separate the cold-bound meat pieces. Only extreme tugging and pulling could separate the meat.

Taste Test Results

No specific age or gender demographic data was recorded for the taste test survey; however, most participants were parents and adult friends of Cal Poly, SLO university students. A minority number of 18-23 year old students also participated. It was estimated that men composed 60 percent of all tasters.

A majority of taste-testers said they eat lamb. In response to the consumer survey question, "How often do you eat lamb?" 25 percent, 18 percent and 21 percent of respondents said they eat lamb at least once every three months, six months or 12 months, respectively. Thirty six percent of those surveyed reported not eating lamb in recent memory.

Ninety-six percent of all taste testers rated the overall taste of the restructured lamb chop as either very acceptable or acceptable. Four percent gave the product a moderately acceptable rating. No testers rated it unacceptable.

In response to the question, "When eating at a restaurant, would you select lamb chops from the menu if you were confident that the eating experience would be equal to the sample just tasted?" Sixty-six percent reported they definitely would, while 21 percent would seriously consider it. Thirteen percent said they would most likely not order lamb at all.

Seventy-eight percent of all taste-testers said they would purchase lamb in the grocery store if they were sure the product would be equal in quality to that in the survey.

Of the most frequent lamb consumers (respondents reporting eating lamb at least once every three months), all rated the overall taste of the restructured chops as either very acceptable or acceptable. Eighty-four percent reported they would definitely select this product from a restaurant menu, while 88 percent indicated an interest in buying it at the grocery store for home preparation.

Forty percent of survey respondents offered personal thoughts or comments. Most comments regarding taste, texture and flavor were positive. Seventy percent described their taste experience using words and phrases such as good tasting, very good, delicious, good flavor and very tender. Some consumers expressed a desire for more seasoning or improved flavor. This is of interest, since cold-set meat technology allows for the inclusion of flavorings in the meat prior to coating with binding agent.



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Impact Statements

- ◆ Yield of denuded lamb shoulder muscle was low.
- ◆ Fibrimex, a natural binding agent, was used successfully to produce a cold-set bound lamb chop with sufficient strength to withstand normal handling and cooking preparation.
- ◆ A majority of volunteer taste test participants reported eating lamb at least once a year.
- ◆ Most taste testers rated the overall taste of the restructured lamb chop as either very acceptable or acceptable and expressed an interest in purchasing it when eating out or for home preparation.
- ◆ Cold set meat technology holds promise for the development of new lamb products and increased sheep meat consumption.

Dissemination

Presentations:

- ◆ Vance, R. D. (6/18/02). Project final report and product evaluation. California Sheep Commission, Sacramento, California.
- ◆ Vance, R. D. (08/16/02) Project report. National Meat Association Board of Directors, Sedona, Arizona.

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For More Information

This research report contains summarized results of Robert Vance's study entitled "Development of a Cold-set Restructured Lamb Chop," ARI Project No. 02-3-054 (Research Focus Area: *Food Science*). To view and/or obtain a copy of the complete final report, or to obtain additional information about this or other research projects, visit the ARI website at ari.calstate.edu. For information on projects specific to Cal Poly San Luis Obispo, visit the Cal Poly ARI website at ari.calpoly.edu.

The Agricultural Research Initiative (ARI) is a California State University (CSU) multiple campus collaborative partnership between the CSU colleges of agriculture and the state's agriculture and natural resources industries and allied business communities. ARI provides public funds that are matched with industry resources to fund high impact applied agricultural and natural resources research, development, and technology transfer, as well as related public and industry education and outreach. ARI projects and programs improve the economic efficiency, productivity, profitability, and sustainability of California agriculture while providing for consumer sensitive and environmentally sound food and agriculture systems and fostering public confidence in food safety and agricultural research and production systems.

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