

An Update on Mechanically Separated Meat

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Revised rules for Mechanically Separated Species MS(S) were published on June 29 one year ago (USDA, 1982). Specific product names for MS(S) include "Mechanically Separated Beef," "Mechanically Separated Pork" and "Mechanically Separated Lamb." The following regulations are in effect:

1. At least 98% of the bone particles shall have a maximum size no greater than .5 mm in their greatest dimension, and there shall be no particles of bone powder larger than .85 mm in their greatest dimension.
2. Calcium content shall not exceed .75%. This is equivalent to a bone solids content of not more than 3%. A maximum tolerance of .90% calcium on a single analysis is permitted.
3. A running average of 10 analyses for protein content of not less than 14% and a fat content of not more than 30% are required unless MS(S) is used in products with a limit on the maximum fat content. A minimum tolerance of 13.0% on protein and a maximum of 33.0% on fat on a single analysis is allowed.
4. A minimum protein efficiency ratio of 2.5 is required, or an essential amino acid content of at least 33% of the total amino acids is accepted.
5. MS(S) may constitute up to 20% of the product but it cannot be used in such items as baby food, ground beef, hamburger, fabricated steaks, certain cured pork cuts, meat pies and a few additional items.
6. MS(S) can be used in beef patties, pressed and chopped ham, a variety of fresh, smoked and cooked sausages, stews, sauces, spreads and similar products.

The 1982 ruling, as published in the June 29 Federal Register, modified the previous definition, standard and labeling requirements. Mechanically Separated (Species) was defined as finely comminuted product resulting from the mechanical separation and removal of most of the bone from attached skeletal muscle of livestock carcasses and parts of carcasses. Some of the major changes in the 1982 regulations over the previous 1978 regulations were as follows: (1) a change in name; (2) establishment of two categories of MS(S), one which meets the fat and protein requirement and a second with no fat and protein requirements; (3) use of the second category of product permitted only in products where

fat is limited; (4) deleted the requirement that names of all products containing MS(S) must be qualified by a phrase indicating its presence; (5) replaced the requirement that the names be further qualified to indicate the amount of powdered bone they contain with a requirement that their labels declare calcium content if the amount of calcium in the finished product contributes 20 mg or more of calcium to a serving. Meat products normally higher in calcium would be exempted if they could be made with MS(S) as an ingredient and not increase calcium over the non-MS(S) containing product; (6) added labeling requirements for the product in order to assure compliance with the regulations.

The purpose of these amendments to the 1978 regulations was to facilitate the production and use of MS(S). The red meat industry had contended that its failure to market products from mechanical deboners was due to regulatory requirements which go beyond what is necessary to protect the public. The meat industry was particularly concerned about the misleading labeling and the unreasonable compositional standards imposed in 1978. A more detailed discussion of the 1978 regulations was given by the author at the 1981 RMC (Field, 1981a) and historical background relating to the "Mechanically Separated (Species), Mechanically Processed (Species) Product, Mechanically Deboned Meat and Tissue From Ground Bone" episodes can be found in the current and past regulations, as well as in the review by Field (1981b).

The present regulations for mechanically separated beef, pork and lamb have been in existence for a year but many companies who purchased deboning equipment in the 1970's still have the machines idle. It is fair to ask what has limited production of MS(S) in the U.S. this past year. Meat processors failed to start their deboning machines after the 1982 regulations were issued because four consumer groups filed suit to block the USDA's new rules. The groups argued that addition of powdered bone to meat products without requiring the name of the product be qualified by a phrase indicating that Mechanically Processed (Species) Product was present and without requirement of a further qualifying phrase listing the percentage of powdered bone which might be present, constituted misbranding and mislabeling. The U.S. District Court for the District of Columbia ruled on the consumer groups' motion for summary judgment on December 1, 1982. The court denied the consumer motion for summary judgment, saying interested parties were given sufficient opportunity to discuss the issue. In the opinion of this author, that is the understatement of the decade. The strong decision in favor of the USDA's ruling delighted the meat industry because it allowed the meat industry to use mechanical methods for separating meat from bone. These

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methods had been used in the poultry and fish industries for years and helped to give the poultry and fish industries a competitive advantage over red meat.

Shortly after the District Court judge upheld the new MS(S) regulations, consumer groups appealed the decision. To date the case has not been resolved. The effect of the most recent appeal was to delay again large-volume production and utilization of MS(S) in the U.S. Now, even though it appears that MS(S) will be produced, this won't be assured until the appeal is resolved. In the meantime, the 1982 regulations are in effect and MS(S) may be processed and used in products under the terms published in the June 29, 1982 Federal Register. Some production of MS(S) is underway and other packers are considering starting their machines.

In addition to the legal aspects associated with MS(S), other considerations have slowed production the first part of 1983. After USDA approval, public approval needs to follow. Because of the poor image mechanically separated meat has obtained as a result of the many court hearings and bad press, those now producing MS(S) find that there is little demand and those who would produce and use MS(S) "in house" hesitate to obtain new label approval and list MS(S) in the ingredient statement. Much of the MS(S) that is being used is used in institutional foods. Many of those who hesitate to use MS(S) in their labeled products are using mechanically deboned poultry produced by the same processes that would be used to produce mechanically separated beef, pork or lamb. Mechanically deboned poultry enjoys a good image. In 1980 approximately 148 million kg was produced and consumed in the U.S. (Przybia, 1981). It is estimated that over 200 companies have poultry machines in operation in the U.S. today and that production exceeds the 1980 figure.

Difficulty in meeting the standards for bone particle size or for calcium is a third reason why more MS(S) hasn't been produced in the first part of 1983. The 1982 regulations state that at least 98% of the particles of bone powder must be equal to or less than .5 mm in their greatest dimension. Some mechanical deboners are meeting this regulation but, according to the review by Field (1981b), many have problems with the requirement. Most deboners have difficulty producing MS(S) in which no particles of bone powder are over .85 mm in their greatest dimension. Particles which are slightly over .85 mm in length are usually thin (.1-.5 mm) and fragile. It is generally agreed that bone particles are digestible and non-irritating and that no injury from these particles is possible (Kolbye and Nelson, 1977; Childers et al., 1979; Field, 1981b). Nevertheless MS(S) which has bone particles over .85 mm is out of compliance. Bone particles over .85 mm have not been a problem for mechanically deboned poultry or for minced fish because bone particle size in these products can be much larger.

Froning et al. (1981) characterized bone particle size from commercial sources. In mechanically deboned chicken 21% of the bone particles were over .5 mm and 4% were greater than .8 mm. Mechanically deboned cooked fowl meat had a larger proportion of the total bone particles out of compliance with the current red meat regulations for MS(S); 55% of the bone particles were over .5 mm and 14% were greater than .8 mm.

Variation in bone particle size in the study by Froning et al.

(1981) and the review by Field (1981b) emphasizes the need for additional research in this area. Some questions which need to be answered follow: 1. Is bone particle size in MS(S) from cooked vs raw bone-in cuts the same? 2. Do round bones produce the same particle size as flat bones? 3. Do bones from younger animals produce the same particle size as bones from older animals? 4. Do bones with more meat attached produce MS(S) with the same particle size as bones with less meat attached? 5. How does yield of MS(S) influence bone particle size? 6. What variations in equipment can alter bone particle size? 7. What processes after deboning reduce bone particle size? 8. Can processes which will reduce bone particle size after deboning be developed? 9. What species differences exist? and 10. Do bones from hot boned meat run immediately produce different bone particle sizes than bones run cold? Answers to these questions are surely needed before any further changes in the red meat or poultry regulations on bone particle size are proposed. In addition, many of the preceding questions need to be asked, substituting the words "bone hardness" for "bone particle size."

In 1979 when the need for revision of the standards for mechanically deboned poultry (MDP) was discussed, 90% of the 201 comments filed opposed additional regulations (USDA, 1979). The Poultry and Egg Institute used a very convincing argument. They stated that "the use of MDP for 15 years bears testimony to its acceptability by the consumer." They said that the report "Health and Safety aspects of the use of Mechanically Deboned Poultry" (Murphy et al., 1979) failed to demonstrate the need for additional regulatory action. The National Broiler Council said that the report appropriately reflected that MDP is a thoroughly safe, nutritious and excellent product.

When the 1982 regulations for bone particle size in MS(S) were published and the requirement that only 2% of the bone particles could be over .5 mm and that no particles could be over .85 mm was established, further discussion of the issue was given by the USDA (1982). It was pointed out that the USDA (1982) is open to new information that good manufacturing practice may result in somewhat larger bone particles than currently permitted. The Canadian Government allows larger bone particles — 98% less than .84 mm and 100% less than 2.0 mm and some European countries have more liberal standards than Canada.

It would seem to this author that since the composition of bone from poultry and red meat is similar (Taylor et al., 1960; Field et al., 1974), the 15 years that poultry has produced safe, nutritious and excellent products containing up to 100% mechanically deboned poultry should be proof enough that bone particles of the same size as those in poultry should be allowed in red meat. Production of mechanically separated red meat in other countries further substantiates this view. I am optimistic about a satisfactory resolution to the bone particle size issue. The resolution may come from a change in the MS(S) regulations or from an improvement in equipment. If there is to be a change in regulations, the regulations should allow MS(S) to be produced under the same standards as MDP. Not the reverse, as has been suggested in a report to Congress from the General Accounting Office. The report suggests that specific standards and labeling requirements on MDP follow those established for MS(S). The

suggestion is ridiculous when the excellent acceptance, in combination with the safety record, of MDP is considered. Further improvement in some equipment will be needed to reduce the calcium content of MS(S). An alternative solution to the calcium issue would be to accept the author's view that with few exceptions, calcium is good for you (Field, 1981b) and therefore, higher levels should be allowed. It's about time that MS(S) be recognized for its nutritional pluses instead of emphasizing its "possible dangerous substances" which are found in much higher levels in products like leafy green vegetables and other foods which have a reputation of being highly nutritious (Field, 1981b).

Equipment manufacturers are working on filters and other processes which will allow products from their machines to meet the present (USDA 1982) regulations. One meat processor suggested to the author that perhaps a press-type deboner to reduce calcium content, followed by an auger-type deboner to eliminate larger particles, might be one answer. At the time of this writing, three red meat processors have met the 1982 USDA regulations on 10 or more consecutive lots of MS(S) and are in production. Eight meat processors have approved programs and could begin production in the near future.

In 1982, 579,693 kg of mechanically separated beef, 222,487 kg of mechanically separated pork and 211,564 kg of mechanically separated veal were produced (N. G. Fox, personal communication). The figure may be a little higher in 1983.

It is clear that the millions of kg of wholesome and nutritious red meat which are now being wasted because the meat cannot be economically removed from the bones by hand can and should be saved. I am optimistic that in the future MS(S) will be saved and that the public image will improve.

Alfred P. Doolittle in the musical "My Fair Lady" summed it up when he said "With a little bit of luck; with a little bit of luck, we can have it all and not get hooked."

Discussion

Russell Cross, U.S. Meat Animal Research Center: You seem optimistic that the industries are going to move into the direction of Mechanically Separated Meat. Do you think they're going to do it with the current regulation, or are we going to need a regulation change of bone particle size?

R. A. Field: A modification in equipment would be the easiest way to go. There are a few people producing such equipment at the present. There are six companies exhibiting at meat industry equipment shows at the present time. Some are press machines and some auger machines. These peo-

ple argue about which is best. One producer a while ago suggested he was going to try both machines. He was going to use the press machine to lower the calcium content, which it will do often down to .2% or .3%. This gets much below the .7% which is allowed according to standards. The problem with press machines is that the bone particles which come through are often large. They are very thin; like .1 mm in diameter, but they're longer than .8 mm in length. This dimension is the hangup. He was then going to take this mechanically separated meat he got from the press and run it through the auger machine to kick out the larger bones. Something like this, and filters that people with press machines are working on plus other techniques will be the answer, not a change in regulations. I felt I did not have enough time to discuss the bone particle issue any more in my talk; but in the written manuscript, I do have 9 or 10 questions I think must be answered with regard to bone particle size before there is a change in regulation. Perhaps standards can be met in the near future with additional engineering improvements in the equipment.

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