Project Title: Presence of Central Nervous System (CNS) Tissue In Advanced Meat Recovery (AMR) Products


Completion Date: April 2001

Layman Summary:

The continued effort to eliminate central nervous system (CNS) tissue from the food supply, even in the absence of any known BSE cases in the USA, is a prudent approach to protecting the markets for American beef. This study examined the incidence of CNS contamination resulting from different beef processing methods and studied the effects of heat and chemical additives on the detection of CNS. Two methods of detection for the presence of CNS tissue in meat products use an enzyme-linked immunosorbent assay (ELISA) for the detection of CNS tissue. Both methods were evaluated in this study. One, which tests for the presence of a neural protein called syntaxin 1-B, was previously tested for accuracy in detecting CNS contamination of blood after captive bolt, pithing and air injection stunning (Anil, et al., 1999; Love, et al., 2000). The GFAP ELISA, tests for the presence and level of GFAP, or glial fibrillary acidic protein, an indicator of CNS tissue in meat.

Advanced meat recovery (AMR) products from six beef processing plants around the United States were used for this study, as well as modified AMR samples. Samples included 50 separate samples from the machinery and recovery systems from the 6 plants obtained over a one-hour period. Modified AMR samples were obtained from the start of the production shift from clean machinery, and again at later in the production shift. Both samples were originally 30 lbs, and were then analyzed as 50 sub samples for GFAP. Ground beef patty samples were obtained from the major suppliers of large fast food chains from diverse geographic locations throughout the U.S. Seven different ground beef patties were obtained in 100 g samples, which were then sampled raw and analyzed for GFAP.

The syntaxin 1-B ELISA was found to be inferior to the GFAP ELISA in detection of CNS tissue in meat, most likely due to syntaxin 1-B tissue concentrations being much lower in muscle than GFAP. AMR product, modified AMR product and ground beef patty samples contained <1 ng/mg wet weight, which is equivalent to 0.05% of spinal cord GFAP, indicating low levels of CNS tissue present in the samples. The GFAP ELISA test was found to be effective on cooked meat and sausage, but not on canned meat and...
sausage. It was found that when beef neck bones were modified by removal of the spinal cord channel, the level of GFAP in modified AMR was reduced dramatically.

This study concluded that the amount of neural tissue in meat products, such as ground beef and AMR, is extremely low to non-detectable. Also, the fluorescent GFAP ELISA test is convenient, rapid, sensitive and not influenced by heating to 180°F for one hour or by sausage additives. Hence, the ELISA test for neural tissue provides an important tool to beef processors and consumers to ensure proper production practices and a safe meat product.