

## DISEASE MONITORING IN PACKING HOUSES

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Many approaches can be taken to monitor the disease status of herds. Inspection at packing houses performed routinely on selected animals has long been an important addition to health monitoring in swine and poultry. Prior to 1980, routine beef cattle inspections were typically limited to monitoring liver abscesses. This paper describes the technique of conducting a routine health management inspection in a modern packing plant. This technique has evolved over the past decade.

### ROUTINE INSPECTION OF CATTLE FROM FEEDLOTS

It is crucial to the success of your inspection to establish a working relationship with the packing plant management and personnel before trying to conduct a packing plant inspection. The management and personnel should be expecting you on the day of an inspection. They should know what you want to accomplish and what samples you are interested in collecting. If you and the packing plant supervisors are not prepared for your objectives, your presence can increase the danger to the workers in packing houses processing 300 animals an hour.

It is important for the USDA-FSIS Veterinary Medical Officer and his inspectors to be familiar with your activities. If your activities interfere with the proper inspection of animals or cause contamination of animals, you will not only lose your welcome in the plant, but you may be held liable for the product loss.

Establish a list of objectives for each set of cattle inspected. These will be influenced by the presenting history.

#### Standard pre-packer processing information:

- What is the description of the cattle?
- How many cattle will be involved in the inspection?
- From where did the cattle come?
- What was their background prior to feedlot placement?
- What is the history of performance in the feedlot?
- What is the history of problems in the feedlot?

If it is useful to examine the cattle as a group and their records prior to presentation at the packing house. This pre-processing examination allows you to formulate a specific approach to gathering the information you need. It also allows you to have specific treatment information on individual animals you may need to look at, or information you may feel is important to share with the USDA-FSIS Veterinary Medical Officer.

**Standard equipment needed to conduct a packing house inspection.**

Approved hard hat	Protective clothing
Protective glasses	Protective ear plugs
Stopwatch	Sample bags and markers
Note cards	Waterproof ink pens
Sharp knife & sheath	Approved protective glove

**Standard packing house inspection objectives:**

- Variation in animal frame size.....percent +/- 25 cm
- Identification tags.....inspection verification
- Implant retention.....rate
- Implanting technique assessment.....rate
- Carcass bruising.....rate, location, age, & severity
- Carcass contamination from hides.....rate
- Variation in carcass finish.....estimated +/- one yield grade
- Abdominal adhesions.....rate, etiology, and severity
- Liver abnormalities.....rate, etiology and severity
- Heart abnormalities.....rate and etiology
- Large/small intestinal abnormalities..rate
- Rumen abnormalities.....rate, etiology, and severity
- Abomasal abnormalities.....rate, etiology, and severity
- Lung abnormalities.....rate, etiology, and severity
- kidney abnormalities.....rate, etiology and severity
- Reproductive abnormalities.....pregnancy staging and rate
- Carcass trim caused by adhesions.....severity
- Carcass trim caused by injections.....rate, location, severity
- Carcass retention.....rate

This list of objectives follows the order in which observations can be made as the animals progress through the packing plant.

**KNOW YOUR OBJECTIVES**

It is important to understand that cattle move past an inspection location at the approximate rate of five animals per minute and the typical processing line holds less than 150 animals. When inspecting a group of 150 animals, the first animal processed will be in the cooler before the last animal enters the processing line. At certain inspection locations it will be possible to gather information on only a portion of the animals being processed. Based on your pre-processing examination and

evaluation of the cattle, you should be able to prioritize the appropriate objectives. While you will be able to collect data on all of the listed objectives, it is important to target specific objectives based on the clinical history.

Before you can establish the number of observations to be taken associated with each objective, you must estimate the rate of occurrence of each defect you expect to find. If the incidence rate of the defect you are recording is low you will be required to take more observations to accurately evaluate the occurrence. Analysis of your observations should consider animals do not come through the processing line in random order.

#### **MAP THE CHAIN SPEED AND INSPECTION LOCATIONS IN A PACKING PLANT**

It is important to know exactly where your inspection locations will be in a plant, exactly how many animals are between inspection locations and exactly how long it will take an animal to get from one location to another. To collect data on specific targeted objectives you must know exactly where each animal will be in the packing plant during processing.

It is even more important to know where to stand and how to stay out of the way of inspectors and packing plant workers. It is in your best interest to get to the packing plant one to two hours early. You will have time to establish the proper inspection locations and note how to avoid interfering with inspectors or plant workers. You may also benefit if the schedule changes. It is not uncommon for packing plants to change the processing order on groups of cattle, but seldom will they move the processing time up more than two hours. By being early you are less likely to miss the cattle you need to inspect.

You can accurately determine the rate cattle are being processed (chain speed) by using your stopwatch. For example, the plant may be processing an average of 270 animals per hour (4.5/minute), but if they are processing 280 animal per hour (4.7/minute) during the time you are inspecting you could miss important information because you overestimated the time you would have between inspecting implants and inspecting lungs. You must know how many animals will be on the rail between inspection locations, and how long it takes for an animal to get from one location to another. For example, if 23 animals will be on the rail between the location you inspect lungs and the location you inspect larynxes, being off by 0.1 animals per minute could cause you to miss an important observation by six seconds.

Having made your plant speed and location map, and knowing the number of cattle in the group you are to inspect, you can establish how many animals you have time to observe at each location. Start your stopwatch when you begin inspecting, record the number of defects, and calculate the rate of defects based on the observed defects per time. For example, if the chain is moving 4.7 animals per minute past you and you observe 25

implants missing in 19 minutes the rate would be  $[25/(4.7*19)]$  or  $[25/89]$  28 percent. During an inspection you only need to record the defects per location and the time at the location.

If you are organized and have some experience, there are many objectives on which you can collect data at the same time. For example, variation in frame size, implant technique, implant retention, and verification of animal identification can be collected at the same time. If you get to the packing plant early you can establish which objectives you can group at each location.

Additionally, the USDA-FSIS inspectors keep track of selected defects. For example, the USDA-FSIS inspectors count liver abscesses. If critical evaluation of the severity of liver abscess is not a concern, recording the beginning and ending liver abscess count on the cattle you are inspecting will provide you with the liver abscess rate for the cattle you inspected.

**THE REPORT**

It is best for your next call to be to the feedlot from which the cattle came and have a conference with the manager to discuss your findings.

This is an example of a typical report. (Note: All data is summarized on the first page along with comparative data from other cattle collected during the same time period (baseline data). Additional discussion details the analysis for each objective.)

PACKER INSPECTION REPORT

For: Pen xxx            xxxxxxxxxxxxxxxx  
                               xxxxxx  
 date: xx/xx/xx        xxxxxxxxxxxxxx, xx xxxxx  
                               (xxx)xxx-xxxx

179 heifers from pen xxx processed at xxxxx xxxxxx, Saturday, September 7th.

The inspection included: frame size variation (FSV) and carcass finish variation (CFV), implants absorbed-missing-abscessed-bunched-embedded (IMP), pregnancy rate (PREG) and age, liver abscess rates (LIVAB), fluke infestation (LIVFLK), intestinal adhesions (ADHES) and function, stomach parasites (PARA), heart abnormalities (HEART), lung (LUNG) and trachea abnormalities (TRAK), kidney abnormalities (KID), carcass bruises BRUS), and injection trim (ITRIM).

INSPECTION RESULTS: \* = approximate number, (#) = # or % of the 1442 animals processed prior to pen xxx.

OBJECTIVES:	Summary of Observations										
FSV	*(12)	7	PREG	(6)	6	ADHES	(16)	0	LUNG	(4)	0
CFV	*(40)	22	LIVAB	(160)	9	PARA	?	50	TRAK	(22)	1
IMP	(62)	35	LIVFLK	(46)	4	HEART	(7)	1	KID	(166)	65
BRUS	(67)	5	ITRIM	(0)	0						

Frame size variation (FSV) can be due to size sorting, genetic differences, and differences in animal performance caused by disease. FSV will correspond to problems with uniform quality and yield grading scores from the packer. Most of the smaller carcasses had severe kidney lesions. Seven percent variation is typical for most groups of cattle.

Carcass finish variation (CFV) is most often associated with genetic differences in cattle, and the number observed would be approximately the number of FSV. In this set of animals the CFVs seemed to be associated with animals that had severe kidney lesions. CFV can be associated with animals sorting their ration. Animals that do not feel well may be more inclined to sort rations. At the pre-processing examination of the cattle at the feedlot earlier in the week, we observed the cattle sorting their ration. We found a substantial difference in the color and pH of the cattle's feces. The feed sorting could be due to length of hay in the ration which could lead to mixing difficulty.

All implants observed were found in the right ear. The implants appeared to be Synovex-H. One hundred and seventeen animals had implants that were normal in size and position. Sixty two animals had implants that were either absorbed, missing, abscessed, bunched, or embedded in cartilage. Approximately 35 animals had implants that appeared to have been absorbed. Approximately 15 animals had implants that appeared to be abscessed or had been abscessed and the implant expelled. Approximately 10 animals had implants that appeared to be bunched. Virtually none of the implants appeared to be embedded in cartilage.

There were only six pregnant heifers. The stage of the pregnancy at the beginning of the feeding period and the number of heifers pregnant would have made it impractical to have preg checked or mass aborted this group of animals. The loss of weight per pregnant animal at processing was approximately 50 pounds (less than six months pregnant). Pregnant animals are more efficient if they do not deliver during the feeding period. When feed efficiency versus weight loss is considered in this set of heifers, the total loss to the feeder would be approximately \$100. The value to the packer would have been increased as the animals were sold in the meat and two liters of fetal blood were harvested.

The liver abscess rate in this group of animals is lower than expected. Poor feed consumption due to a chronic disease process could be the cause.

The liver fluke infestation rate in this group of animals is below the national average. Four animals from a group of 179 animals would not warrant prevention or treatment.

Adhesions are always of particular interest due to the association with severe liver abscesses, and hardware disease from metal contaminated feed. There were no adhesions observed.

It is disconcerting to find parasite damage in the abomasum due to ostertagia. It was only possible to examine two stomachs, and one had the disease. It may have been the only stomach with the lesion, but it may represent a disease that affected one half of the animals. By special request, xxxxxxx may help us set up to examine a larger number of stomachs in the future. It is important to understand the possible significance of the this disease. When the weather will not allow the parasite to survive outside an animal, the parasite will stop its development and remain in an animal's stomach. When this occurs, the parasite blocks the release of enzymes from the stomach that are important in the digestion of protein. Animals effected with this disease are poor performers. It is very difficult to accurately diagnose this disease, or predict which animals will be diseased during

the high risk months of May, June, July and August. There are three dewormers presently available that will prevent or treat this disease at the recommended dose.

There was an old healing scar on the surface of one heart, probably due to an infection associated with pneumonia earlier in the animal's life. There would have been no production loss during the previous months associated with this lesion in this animal.

There were no visible lesions in the lungs, or adhesions from the lungs in any of the animals examined.

Only one abnormality in the tracheas was observed. Tracheas often reveal clues as to the reoccurrence of upper respiratory viruses. In our experience, approximately two percent of all animals processed would have lesions in the trachea. Your group had far fewer lesions than the average number we would have expected to see.

One of the most significant problems found was severe kidney scarring in 36% of the animals. We have taken samples and will submit them to the diagnostic laboratory upon your approval. It is doubtful the laboratory will be able to determine the exact cause of the damage. I personally suspect a bacterial disease such as leptospirosis. The damage might also be caused by renal toxic drugs, that might occur with undiluted antibiotics given intravenously or perhaps a "Bloody Mary" that contained neomycin or gentamicin. The feedlot industry has never been a big user of Lepto vaccines. The research conducted early in the 1970's showed an improvement in animal performance. This research has not been reproduced, but many feedlots routinely use Lepto\_p in the receiving vaccination program. It would be a mistake for anyone to speculate that the use of the vaccine would have prevented the problem observed in these heifers.

One of the floor foremen expressed a concern for bruises in this set of heifers, but none of the carcasses had to be trimmed because of bruising.

No injection lesions were found prior to carcass weighing. Injection lesions found prior to weighing are typically not a serious problem. These most often result from subcutaneous injections and are easily trimmed. The real problem with injection lesions occurs in fabrication, and we will not be able to establish the occurrence, if any, in these cattle. Xxxxxxx has developed a system for tracking cattle from the processing floor to the fabrication room, and in the future we will be able to provide you with this information. It will remain important for you to continue to use only the forequarters and neck for injections, avoiding the hind quarters if at all possible. Continue the use of subcutaneous injections for all animal health products when allowed by the F.D.A. approved label. It is especially important to continue to use ONLY SUBCUTANEOUS CLOSTRIDIAL VACCINES.

**SUMMARY:** The damage found in the kidneys is the most probable reason for the poor performance in these animals. I am concerned with the parasite damage found in one of the stomachs we examined. There were fewer problems with the implant application than in most groups of animals examined. It would be good to review implanting techniques and monitor implant placement on all animals that are pulled for treatment at the feedlot.

## PUTTING INSPECTION RESULTS TO WORK

Using the inspection technique described, and analyzing the reports, the following information was gathered over twelve months on two populations of animals from one cattle feeding organization.

The populations were "non-performing" cattle that had not gained weight at a rate similar to their pen mates, and "normal-performing" cattle. Because the industry is paid for most non-performers based on the animal's grade, yield, and final weight taken from the carcass rail following inspection, the terms "grade and yield" or "railers" are frequently applied to information gathered on non-performing feedlot cattle.

The information from these two populations of cattle typically comes from two different sources. Most large packing plants are designed to process 300 animals per hour and are not capable of humanely handling cattle that weigh less than 400 kgs. Non-performing feedlot cattle frequently fit this constraint and are processed by smaller packers that have more flexibility in the size of animal they process. Additionally, non-performing feedlot cattle frequently have scars from a previous disease. These scars require more time to properly trim the carcass before it can be considered acceptable for marketing. Larger packing plants do not have time to devote to properly handle this class of cattle.

### Percent loss in gross returns to feedlot of non-performing cattle compared to normal-performing cattle.

(2181 non-performing animals were examined, 15120 normal-performing cattle)

<u>Non-performing cattle</u>	<u>Percent decrease in return</u>
All cattle examined	22 percent
Sold first 90 days on feed	18 percent
Sold with pen mates (156 DOF)	37 percent

### Percent change in production cost of non-performing cattle compared to normal performing cattle.

(2181 non-performing animals were examined, 15120 normal-performing cattle)

<u>Non-performing cattle</u>	<u>Percent change in production cost</u>
All cattle examined	404 percent increase
Sold first 90 days on feed	416 percent increase
Sold with pen mates (156 DOF)	316 percent increase

### The reasons for non-performance in 2181 animals were

Chronic respiratory infection.....	53% (1156)
Chronic musculoskeletal infection/injury.....	30% ( 654)
Intestinal parasites (ostratagia/flukes).....	12% ( 240)
Chronic digestive infection/injury.....	5% ( 109)
Other.....	1% ( 22)

**Loss at packers from chronic respiratory disease by severity**

SEVERE (<320 kgs) Percent condemned (19 % due to injection site damage)...30%  
 SEVERE (<320 kgs) Passed but decreased gross return by..... 71%  
 Mild (320-400 kgs) Decreased gross return by.....30%

**Loss @ packers in normal-performing cattle from sub-clinical or healed disease**  
 (Sub-clinical disease in 2722 of 15120 animals [18%] )

All sub-clinical disease (decrease in gross return) ..... 3.4 percent  
 Liver condemnations (1694 animals [11.2%] ) ..... 0.9 percent

**Loss at packers in normal-performing heifer from pregnancy**  
 (Loss adjusted for recovery of fetal blood)

Pregnancy rate for all heifer inspected (2668 heifers)..... 12 percent  
 January (1102 heifers) Decrease in gross return..... 22 percent  
 July (1566 heifers) Decrease in gross return..... 8 percent

Additional observations were made but the data represented here indicates the value of inspecting cattle at the packing house to a beef feedlot.

**FINAL THOUGHTS**

The confidence gained gathering useful information from packing house inspections of beef cattle was vital to the development of the first Verified Production Control program certified by the USDA-FSIS.

The packing houses involved in the early surveys were not fabricating carcasses. The identification of additional product loss associated with injection site damage in the population of normal-performing animals has been identified since 1988. The awareness of this problem is in part due to the increasing number of packing houses fabricating carcasses into wholesale cuts or "boxed beef". This problem points out the value consulting feedlot veterinarians may serve to their feedlots and the beef feeding industry by establishing inspection protocols appropriate to the fabrication process.

Monitoring cattle at packing plants is extremely useful, not only to the feedlot, but to the practicing veterinarian. It is the best way to identify sub-clinical disease, both infectious and management, assess health performance, and monitor beef quality. Routine inspections provide useful information to the feedlot from which management decisions can be improved. It also provides the veterinarian with information which is useful in helping to improve disease management. Total Quality Management seems to be a popular phrase in the 90's. Few veterinary techniques will allow you to participate any better than packing plant inspections of cattle.