IMPLEMENTATION OF THE GOOD MANUFACTURING PRACTICE (GMP) CODE FOR HYGIENIC COLLECTION OF BLOOD FOR HUMAN CONSUMPTION

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SUMMARY

A GMP-code for hygienic collection of blood for human consumption in the Netherlands, as part of quality control and product safety, was stated by the Advisory Committee for Meat Inspection. In this study the code was implemented in a pig slaughterhouse with a semi open blood collecting system. The purpose of this experiment was to obtain knowledge of problems that could occur during implementation and to find out whether the bacteriological reference value outlined in the code (pig blood < 4.65 in log cfu/ml) was achievable. This experiment could serve as an example for application of the code in other slaughterhouses. Elements of the Hazard Analysis Critical Control Point (HACCP) system were used to structure the implementation. A working group was formed and a program was set up which contained analysis of critical points, technical adjustments and control possibilities, education and motivation of management staff and production personnel and the final implementation. Important critical points in this slaughterhouse were the irregular supply of pigs, the construction of the blood collecting vessel and the construction of the vessel for the anticoagulant agent. The last two were replaced. The supply of pigs was improved by placing a walking-beam. In short, the application of GMP as described in the code was more complicated than expected. The costs to realize the necessary technical adjustments were relatively high and it appeared to be difficult to motivate the personnel to work hygienically with the new system. Under optimal technical and personnel conditions the amount of collected blood could be nearly as high as without the application of the code. It turned out to be possible to achieve a lower bacterial count than the bacteriological reference value outlined in the code.

Introduction

In the scope of quality control and product safety, investigations concerning the collection and storage of blood for human consumption were carried out. Two blood collecting companies were invited to participate in the project. Based on this research (Oostrom et al., 1990) the GMP-code for hygienic collection of blood for human consumption in the Netherlands was stated by the Advisory Committee for Meat Inspection (Anonymous, 1991).

The next step involved the implementation of this GMP-code in slaughterhouses. Frequently the HACCP-system is used to implement GMP-codes (Anonymous 1992). This system should consist of the following components: a hazard analysis, determining and monitoring critical points, educating personnel and documenting results (Tompkin, 1990).

A first implementation was carried out at a pig slaughterhouse where a semi open blood collecting system was used.

The purpose of this first implementation was to obtain knowledge of problems that can occur during implementation and to find out whether the bacteriological reference value outlined in the code (pig blood < 4,65 in log cfu/ml) was achievable.

Implementation program

Elements of the HACCP system were used to structure the implementation. A working group was formed which set up an implementation program. Members of the working group were representatives from the blood processing company (technical adjustments), the pig slaughterhouse (execution), Meat Inspection Service (advising) and researchers (guiding).

The implementation program was carried out in the following stages:

A. Analysis of critical points;
B. Motivation and training of production personnel and management staff;
C. Technical adjustments and control possibilities;
D. Final implementation.

A. Analysis of critical points

Five important critical points at the slaughterhouse were found to be; 1) an irregular supply of pigs at the blood collecting vessel caused by human handling. If too many pigs were above the blood collecting vessel at the same time, the blood from one pig flowed over the legs of another pig before it reached the blood collecting vessel. 2) the construction of the blood collecting vessel allowed legs to contaminate the blood. 3) the vessel for the anticoagulant agent. This agent was made in batches for several days, resulting in contaminated left-overs which were used the next days. The vessel was not connected with the automatic cleaning system (CIP), resulting in even more contamination of the anticoagulant agent. 4) the cleaning of the knives. Specific equipment for cleaning and disinfection of the knives was not present. The knives were only accidentally rinsed with cold water. 5) The cleaning and disinfection of the blood collecting equipment was not monitored effectively.

B. Motivation and training of production personnel and management staff

To alert and motivate the personnel to the importance of working hygienically and the consequences of not doing so, two instruction lectures about quality control and cleaning and disinfection were delivered.

C. Technical adjustments and monitoring

1) Supply of pigs. To regulate the supply of pigs at the blood collecting vessel and to avoid buffering, a walking-beam was placed in line. In this way pigs got to the blood collecting vessel more gradual and with a certain distance between each other so they could not contaminate each other. Placing the walking beam had as result that the supply for the restrainer had to be slower and more gradual. This required an adjustment of attitude for the people involved. Technically it was rather complicated to adjust the walking beam to the line.

2) Blood collecting vessel. The blood collecting vessel was replaced by a new one which had a narrower opening. The legs were led along the vessel so they could hardly get into the vessel. Also the new vessel was connected to the automatic cleaning system.

3) Vessel for the anticoagulant. This vessel was also replaced by a new one which was connected to the automatic cleaning system. As a consequence the anticoagulant agent had to be freshly prepared every day. The required amount of anticoagulant agent had to be calculated more accurately.

4) Cleaning of the knives. Cleaning and disinfection equipment was constructed but it took time before the personnel got used to it.

5) A checklist was set up for the visual checking of the cleaning and disinfection of the blood collecting equipment and the results were written down. This is one example of monitoring the process. The slaughterhouse had to extend this system until all critical points were controlled and registered but this has to be done step by step in order to adept the personnel behaviour to the changes.

D. Final implementation

A schedule of four weeks was set up to finalize the implementation. During the first week guidance was given and samples were taken for bacteriological examination. At the end of every day an evaluation took place. During the second, third and fourth week the implementation was guided and samples were taken once a week. From week five onwards samples were taken by the blood processing company and the slaughterhouse.

Results

The first attempt to implement the GMP-code was stopped after three days because further adjustments were necessary to meet the requirements in the GMP-code. After the adjustments were made, the implementation started again. Now most parts of the code were found to be satisfied by means of observation. Improvements were still possible in the supply of pigs (sometimes still too irregular), the cleaning of the knives and monitoring the critical points.

The bacteriological quality of the blood is shown in table 1. Only in a few cases the bacteriological reference value was exceeded. The high bacteriological counts however, can be explained by problems in the

production: On day 1 the pipe for the anticoagulant agent came loose, resulting in clotting of the blood and obstructed pipes. After rinsing with cold water the blood collection started again. On day 23 the cleaning program failed, resulting in higher bacteriological counts on day 24.

Discussion and conclusions

The implementation of GMP for blood collection at slaughter was quite difficult because the collection of blood appeared to be rather complicated. Until yet, good hygienic quality of blood is not paid more than blood with a moderate hygienic quality. To collect blood with low bacterial counts using a semi open blood collecting system, the supply of pigs is crucial, so important technical adjustments needed to be made (walking beam, blood collecting vessel) and the personnel had to adjust to a new work behaviour. Their motivation appeared to be low when not accompanied by additional information. Furthermore, the technical adjustments were rather complicated and expensive.

The GMP-code refers only to the quality collected blood. But for the slaughterhouse the quantity is an important matter because until now blood is payed by quantity and not by quality. Under optimal personnel and technical conditions it appeared to be possible to collect nearly as much blood as without the application of the GMP-code.

Finally it can be concluded that with a semi open blood collecting system under GMP conditions, it is possible to collect blood of very good bacteriological quality. The reference value outlined in the code appeared to be achievable.

References

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