materials such as carbon black. Many CIP systems on farms and in plants which have carbon-carrying rubber components show a dark deposit when the stainless steel surfaces are swabbed. This compound is carbon black, ostensibly coming from the elastomers deteriorating in contact with chlorinated alkaline cleaners. The use of noncarbon-carrying elastomers might eliminate this "black deposit" problem since no carbon black filler is needed in the neoprene compounds.

These compounds hold promise for use in air and milk tubing on milking machines and for valves and gaskets in pipelines. Its possible uses in milk and food equipment are unlimited.

These inflations make better milk possible. They will save the plant money by reducing field calls; they will last longer and perform better. They will carry less bacteria from cow to cow. They represent a significant advance in the field of sanitation.

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A SCREENING TEST FOR DETERMINING THE SANITARY QUALITY OF PROCESSED POULTRY

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To show that a correlation exists between numbers of bacteria on processed poultry and the resazurin reduction test, a field study was made in hopes that a screening test could be used by the industry and health agencies to help determine the sanitary quality of processed poultry. The study was prompted by the findings of Walker, Coffin and Ayers *(3)*.

METHODS

The work done in this study was carried out by swabbing a series of different carcasses from various age groups. The age groups used were as follows: Fresh, 1 day, 2 days, 7 days. Fresh carcasses were swabbed shortly after killing and while they were still on the lines. All stored carcasses had been put into a chlorine ice slush for 24 hours for chilling and then packed in ice. The carcasses were sampled by swabbing an area 10 cm^2 *(3)*. To increase accuracy of the sample, a sheet metal strip, with a handle, was measured and cut to 2 cm^2. Using this metal strip as a guide, five different areas were swabbed. The areas swabbed were: the left and right rib cage, left and right thighs, and the lower back just above the tail.

Materials used and prepared were as follows:

1. Cotton swabs, three inches, sterilized in a screw cap vial by autoclaving at 121°C for 30 min.
2. Sheet metal strip with handle, measured area 2 cm^2, dipped in 95% alcohol and flamed before use.
3. Peptone, 10 ml of 0.02% solution at pH 7.0 ± 0.1., sterilized in 6-in screw cap vials at 121°C for 15 min.
4. Alcohol, 95% for sanitizing sheet metal strip.
5. Metal container suitable for sanitizing sheet metal strip between carcasses.
6. Sample case.
7. Recombined skimmilk, 5g/100 ml of distilled water sterilized at 115°C for 10 min to prevent "caramelization."
8. Trypticase soy broth.
9. Reduction incubator, preset at 30°C *(3)*.
10. Resazurin, certified for use in testing reduction in milk, prepared according to Standard Methods *(2)*.
11. Nutrient agar pH 7.0 ± 0.1 (Difco)
12. Buffered distilled water *(2)*.

Sampling was done as follows: the sterilized cotton swab was submerged in the sterile 0.02% peptone solution and pressed against the inside of the vial to expel excess solution. The five areas of the carcass previously described were swabbed. After each area was swabbed, the swab was rinsed in the peptone solution. After all areas had been swabbed, the swab was placed in a screw capped vial containing the peptone solution. The vials containing

the swabs were placed in the sample case containing crushed ice. Laboratory analyses were begun not later than 4 hrs after sampling.

The plating procedure was done in accordance with Standard Methods *(2)* with the following exceptions: swab vials were shaken 50 times in an arc of approximately 8 in, striking bottom of vial in palm of hand. Incubation was at room temperature. Plates were counted on the fourth day and counts were reported as number/ml or per cm^2.

The resazurin reduction test was as follows: to the peptone solution containing the swab, 1 ml of trypticase soy broth, 1 ml of recombined skim milk and 1 ml of resazurin solution was added. The vials were inverted twice and tempered to 30°C in the reduction incubator. After samples had tempered, readings were made every 30 minutes and samples were inverted twice at the end of each observation. Readings were recorded in minutes.

For color comparison a control tube may be prepared by using 10 ml of a 0.02% peptone solution, 1 ml of trypticase soy broth, and 1 ml of recombined skim milk and 1 ml of resazurin solution. Autoclave at 121°C for 10 minutes. This pink color will be the end point desired for the test specimens *(3)*.

RESULTS AND DISCUSSION

In order to illustrate graphically the results of this test, a modification of the Hubbs and Perlmutter method *(1)* was used. Figure 1 shows results obtained with carcasses when they were fresh, 24, 48 and 168 hrs. old. All except the fresh carcasses were packed in ice and under refrigeration up to the time they were sampled.

Fresh Poultry

The logarithmic mean bacterial count of 38 samples was 75,000/ml (Figure 1, A). The arithmetic average reduction time was 477 min (Figure 1, B).

After 24 Hours

The logarithmic mean bacterial count of 19 samples was 97,000/ml (Figure 1, C). The arithmetic average reduction time was 470 min (Figure 1, D). In correlating the results of fresh and 14-hr carcasses, it was found that the mean bacterial count for 24-hr. carcasses increased approximately 29% over that of fresh carcasses, while, at the same time the average reduction time decreased by 1.5%.

After 48 Hours

The logarithmic mean bacterial count of 19 samples was 260,000/ml (Figure 1, E). The arithmetic average reduction time was 459 min (Figure 1, F). This increase in bacteria count over the 24-hr carcasses was approximately 168%. The resazurin reduction time was correspondingly reduced by 2.3%.

After 168 Hours

The total count/ml of 19 samples increased to a logarithmic mean of 2,400,000/ml (Figure 1, G). This tremendous increase in bacterial population was closely paralleled by the resazurin reduction time which was reduced to an arithmetic average of 262 min (Figure 1, H). This group of carcasses when compared to 48 hr carcasses showed an 823% increase in the total number of bacteria. By a similar comparison, the resazurin reduction time was reduced by 43%. In comparing freshly processed carcasses with 168-hr carcasses, it was found that the bacterial count increase approximately 3100% during the 168-hr period. The resazurin reduction time was correspondingly reduced by 46.8%.

Based upon the results of this study, the grading of the carcasses in relation to the reduction time in minutes was considered as follows:

Excellent	>480 min
Good	360 min to 480 min
Fair	240 min to 360 min
Poor	<240 min

The preceding results relating reduction time to the condition of the the carcasses are practically identical to the results reported by Walker, Coffin and Ayer *(3)*.

As indicated in Figure 1, the results from approximately 100 carcasses were used in this paper. However, considerably more than 100 carcasses were swabbed and tested to find the desired dilution range for the bacterial plate count.

Approximately 80% of the fresh carcasses fell within plus or minus one standard deviation (43,000/ml) of the logarithmic bacterial mean of 75,000/ml.

The logarithmic bacterial count mean for carcasses after 24 hours was 97,000/ml with the standard deviation being plus or minus 50,000/ml. Of this age group, approximately 73% fell within this range.

The logarithmic bacterial count mean was 260,000/ml for carcasses after 48 hrs. The standard deviation for carcasses after 48 hours was plus or minus 120,000/ml. Approximately 73% fell within this range.

The logarithmic bacterial mean was 2,400,000/ml for carcasses after 168 hrs. The results from these carcasses showed the widest standard deviation range of all age groups, plus or minus 2,300,000/ml. Approximately 58% of this group fell within this range. At the same time, however, the correlation between average bacterial count and average reduction time was closer than for the younger carcasses.

SUMMARY AND CONCLUSIONS

The results indicate that there is a definite cor-

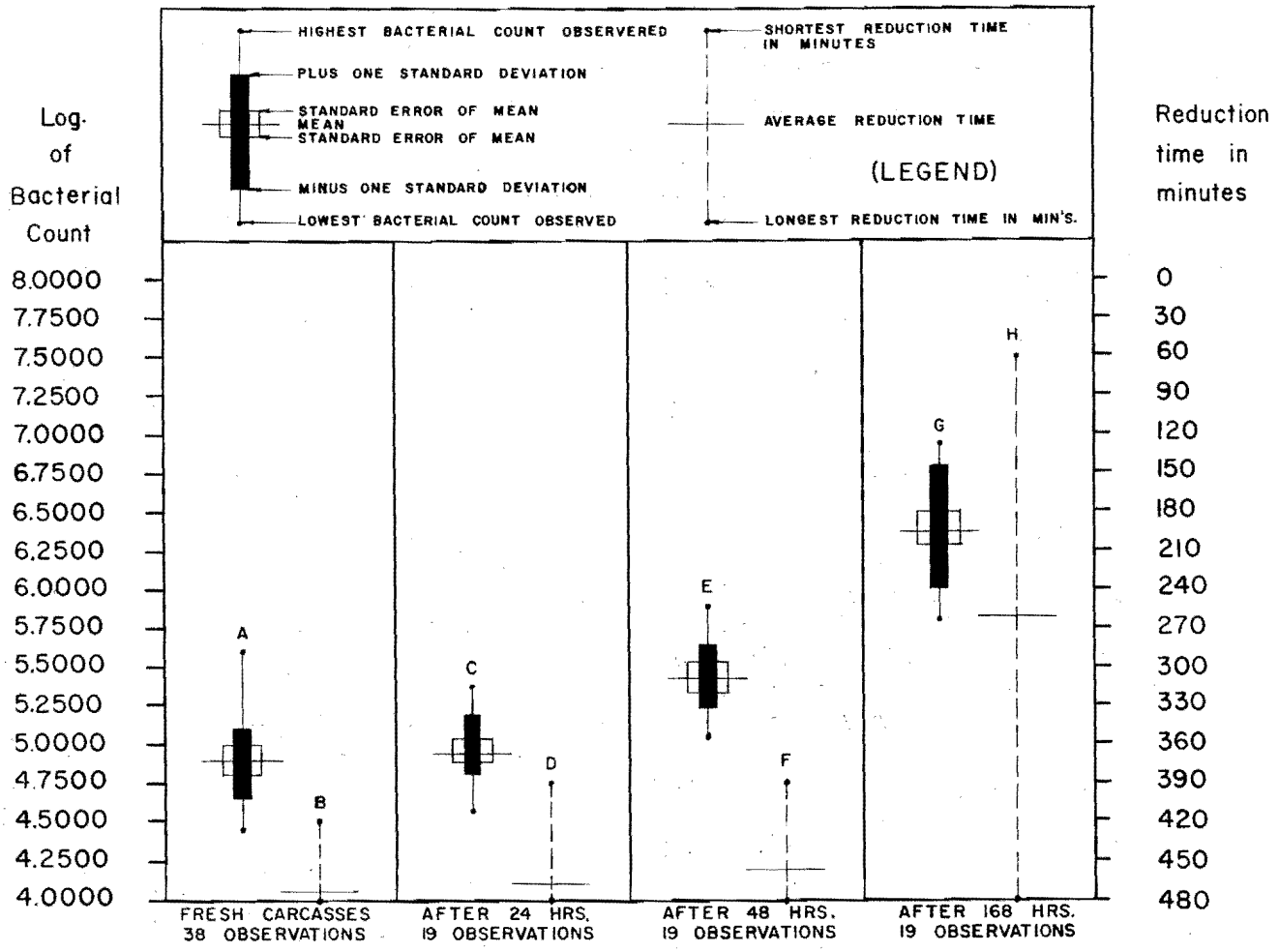

Figure 1. Correlation of Total Counts and Resazurin Reduction Times for Processed Poultry.

relation between the bacterial plate count and the resazurin reduction time. Since the resazurin reduction time was conducted for an 8-hr period, it was necessary for a total of 10^4 or more organisms per ml to be present to reduce the resazurin dye in this length of time *(3)*.

There are several advantages in utilizing the resazurin reduction test in a poultry sanitation control program. The test takes much less time than the plate count. Also, the greater the bacterial contamination, the quicker the result is obtained. Grossly contaminated carcasses might be detected in two hours or less. In a poultry sanitation control program, this test could be used for the purpose of periodically checking the sanitary practices in poultry processing plants. The results would aid the sanitarian in finding and eliminating improper practices.

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