TRIAL OF ZOONO Z-71 SURFACE SANITISER WITHIN CHICKEN SHEDS – SEPTEMBER 2012

Introduction:

In September 2012, Zoono Group was invited by a major (household name) chicken producer, to undertake a comprehensive trial of Zoono's Surface Sanitising product (Zoono Z-71) within poultry broiler sheds (rearing properties) providing livestock on a contract basis to processing plants owned by the client.

Three separate locations were identified – they were similar in size, construction and adopted similar operational protocols. All had comprehensive production records dating back several years and were located within a radius of approx 12 kilometres. All locations have similar climatic and environmental characteristics. As such, it was a straight forward process to conduct like for like testing and provide robust reporting.

Within each facility, a single broiler shed was identified for the purposes of this trial. In each case, the shed was deemed 'typical' of the operation on the facility and not a shed that was subject to additional influences such as limited sunlight / increased exposure to the elements / close proximity to wind break tree lines etc.

These sheds were treated with Zoono Z-71 Surface Sanitiser as supplied by Zoono Group and results were taken, recorded and compared to existing information provided by each facility manager.

A condition of this trial was that the name and physical location of each of the facilities, was to remain anonymous. However, past production figures / mortality rates / livestock weights / supplier details etc were made available for the purposes of comparison.

Trial Objectives:

The objectives of the trial were to:

(a) Test the Zoono Z-71 product for efficacy within broiler sheds at each of the three properties;

(b) Assess any improvement in livestock mortality rates at each location;

(c) Assess any improvement in livestock weight at each location;

(d) Identify any additional benefits of using the Zoono Z-71 product.

(e) Assess the cost effectiveness of the Zoono Z-71 Surface Sanitiser product in comparison with existing products.

The Locations:

For the purpose of this exercise, the physical locations have been identified simply as Location 'A', location 'B' and location 'C'.

Location 'A' Consists of 20 sheds – each is approx 90 metres long x 30 metres wide.
During each growth period, the sheds contain 24,000 chickens.
The shed selected for the trial was identified as Shed E.

Location 'B' Consists of 16 sheds – each is approx 80 metres long and 25 metres wide.
During each growth period, the sheds contain 20,000 chickens.
The shed selected for the trial was identified as Shed 4.

Location 'C' Consists of 24 sheds – each is approx 90 metres long and 30 metres wide.
During each growth period, the sheds contain 22.500 chickens.
The shed selected for the trial was identified as Shed 18.

The Sheds:

The purpose built sheds on each property were similar in structure – each was a single storey, low stud (~3 metre apex) temperature and light controlled facility. Automated feeder and water stations are suspended by wire in rows and can be raised to facilitate easy removal of livestock / removal and replacement of floor material and for cleaning. Feed is provided via mechanised, demand induced feeder stations fed from silos and filtered water is provided into drinking stations and sourced from municipal supply.

The sheds were kept at regulated temperatures. For the first 14 days of the growth cycle, the temperature was kept at a constant 31°C. For the remaining 28 days, the temperature was adjusted to 25°C. All sheds were fitted with controlled ventilated systems. Lighting was also controlled via a timer / dimmer system.

All areas have quarantine systems in place – all vehicles entering the three properties have to pass through a chemical bath system and individual sheds adopt personal quarantine stations including mandatory footwear baths etc.

Rotational Protocol:

At the completion of each cycle, the (approved for use) wood shavings are removed and the entire shed is water blasted / thoroughly cleaned with an approved product prior to the arrival of new livestock. Chicks are delivered direct from the hatchery at the commencement of each 42 day growth / production cycle and prior to arrival they are screened for bacteria / infection and viruses.

What is Zoono?

Zoono is a water-based antibacterial product that is applied as a mist and allowed to dry to form a covalent bond with both hard and soft surfaces. Once dry, the surface resembles a bed of microscopic 'pins' that attract, pierce and kill pathogens via 'lysis' – a principle similar to that of a pin popping a balloon. And, just as the balloon cannot be reformed once destroyed, the same applies with the pathogen – this means that the pathogen cannot develop any immunity to the Zoono active (the 'pin') and this also means that there is NO mutation and NO superbugs!

Zoono has been tested in laboratories around the world and enjoys numerous approvals – including New Zealand Food Safety Authority (C-22), AsureQuality (use in Dairy environments), AQIS (Australia), Environmental Risk Management Authority (NZ) and is even approved for use in Organic environments.

The Zoono active is present in all Zoono products including Zoono Z-71 surface sanitiser, Zoono's GermFree24 Hand Sanitiser, ZoonoTex35 concentrate, the Zoono consumer range of brands etc.

The Trial:

1. The trial was conducted over three successive cycles (each of 42 days duration).
2. Personnel on each site were briefed on the trial and the objectives.
3. All personnel completed non-disclosure documentation.
4. Personnel were briefed on the background of Zoono products and the Z-71 product being evaluated.
5. The sheds were treated with Zoono Z-71 as part of the overall cleaning protocol between cycles.
6. The sheds (with livestock present) were again treated with Zoono Z-71, ~21 days into the cycle.
7. Sheds were assessed (at marked locations) for the presence of pathogens. The methods used were ATP swab tests and parallel CFU counts. CFU testing was completed by the client Company microbiology personnel.
8. Pathogen Testing was conducted on each shed at these intervals:
   - After cleaning, but before livestock was introduced to the shed.
   - After the shed was treated - 21 days into the cycle.
   - At 42 days - before the livestock was removed and sent for processing.
9. Livestock weights were recorded – using the same methodology / practices as per previous cycles.
10. All other management practices were maintained as for previous cycles.
11. Results were collated and regularly reviewed by Zoono / each participant grower / the client.
12. A Summary of Results is attached.

Application Process:

Zoono Z-71 Surface Sanitiser was provided by Zoono Group in 20 Litre containers. The product requires no mixing and was ready for use.

The Zoono product was applied as a mist in each shed. For the sake of consistency, this process was achieved via the use of low pressure backpacks.

Zoono Z-71 was applied at two different times during the growth cycle:

- As the finishing phase of the cleaning / preparation process immediately prior to the introduction of new livestock;
- At the mid point of the growth cycle (21 days) and applied whilst livestock was present.

Two people were trained to complete the application process. To ensure total coverage, the applicators followed 'grid lines' from the overhead feed station wires and the lights. The treatment process took approx 60 minutes per shed.

The backpack nozzles were set to deliver the product as a fine mist. Whilst not calibrated, it was estimated that the Zoono product was being delivered at ~20 microns.

Zoono was applied at ambient temperature. The drying process took approx 25 minutes when part of the initial application but was noticeably quicker to dry (approx 15 minutes) when applied after 21 days and in the presence of livestock / when the temperature was regulated at 25°C.

There were no noticeable effects on the livestock when they were sprayed with the Zoono product. [This was to expectations as Zoono has Food Safety Approvals].

The applicators reported a noticeable difference using Zoono compared to the application protocol required for the application of traditional products. The most obvious element was the lack of a requirement for breathing apparatus when using Zoono – whereas when using formaldehyde based products, facemasks and respirators / BA equipment is mandatory.

ATP Testing:

The ATP 'process' is widely used around the world in any situation where an 'immediate' contaminant measurement is required – for example it is used in virtually all food processing, drinks manufacturing, water processing plants etc, when a start up reading is mandated prior to the commencement of production. Whilst the size of the machine used for testing purposes may vary, the principle is totally accepted and Quality Assurance technicians around the world are very familiar with both the technology and the process.

ATP (adenosine triphosphate) is present in all organic material and is the universal unit of energy used in all living cells. ATP is produced and/or broken down in metabolic processes in all living systems. Processes such as photosynthesis in plants, muscle contraction in humans, respiration in fungi and fermentation in yeast are all driven by ATP. Therefore, most foods and microbial cells will contain some level of naturally occurring ATP. A typical luminometer uses bioluminescence to detect residual ATP as an indicator of surface cleanliness.

The luminometer displays results in RLU (Relative Light Unit) values. The light produced from the reaction between ATP and the enzyme in the snap device reagent is emitted in the form of photons. The luminometer detects these photons, quantifies them, and displays them as an RLU value. This RLU value and the ATP on a surface are in a 1:1 ratio.

Therefore, more ATP present on a surface means more light is emitted in the snap reaction, giving a greater RLU number detected by the luminometer.

The accepted ATP scale adopted globally, is shown:

0 - 30	Considered Food Safe
31 - 100	Considered clean
101 - 200	Caution!
201 - 500	Contaminated
501 - 1000	High Risk of Infection
1000 +	Extreme Risk of Infection

In any environment such as an abattoir / chicken broiler shed containing livestock, an ATP result below 100 (Considered to be Clean), is excellent. Any ATP Test Results below 30 are outstanding – this is the standard required for food manufacture and preparation environments where food is prepared for consumption and where risk of cross contamination is high.

Results:

1. The trial was conducted over three separate cycles – each of 42 days duration. The trial commenced in late September 2012 and concluded in December 2012.
2. The Zoono Z-71 Surface Sanitiser was supplied ready to use and was easy to apply.
3. Whilst results varied by location, it was noticeable that in all cases there was a major reduction in the chicken mortality rates. This reduction immediately transposes to bottle line profitability.
4. It was also noticeable that, in all cases there was an improvement in stock live weight. This was not due to any change in feed / temperature / humidity / lighting, but the consensus was that it was due to the reduction in pathogens present within the environment in which they were situated.
5. ATP results confirmed the reduction in pathogens.
6. As a result of this trial, the client is mandating Zoono Z-71 applications to the protocols used by their contract producers. It was also noted that the three contract growers participating in the trial quickly witnessed the benefits of the Zoono treatment and actually recommended the use of the Zoono brand.
7. Cost was not a factor in subsequent discussions:
   - The cost of Zoono Z-71 was similar to that of the formaldehyde based products previously used.
   - The labour cost of application was similar.
   - Formaldehyde based products could not be used when livestock was present.
   - The benefits were obvious (in the form of reduced livestock mortality and weight improvement).
8. The mortality rates decreased significantly and resulted in more birds being available for production:

   Location 'A' had improvements of: 1737 / 1602 / 1885 birds = a total of **5,224** birds over 3 cycles.
   Location 'B' had improvements of: 1471 / 1354 / 1647 birds = a total of **4.472** birds over 3 cycles.
   Location 'C' had improvements of: 1465 / 1369 / 1515 birds = a total of **4,349** birds over 3 cycles.
   Across all 3 locations, there was an increase of 14,045 birds being sent for production.
9. The average livestock weight also improved:

   Location 'A' (24,000 birds) improved by 4.94% / 3.29% / 3.70% of live weight over 3 cycles.
   Location 'B' (20,500 birds) improved by 4.72% / 4.71% / 3.43% of live weight over 3 cycles.
   Location 'C' (22,500 birds) improved by 3.39% / 2.64% / 3.02% of liveweight over 3 cycles.

   Across all 3 locations, there was an average increase of 3.76% liveweight for production.
10. The ATP test Results improved significantly as a result of the Zoono Z-71 treatment.
11. The CFU Test Results conducted in parallel, verified the ATP results and confirmed similar trends.
12. As a result of the trial, there was considerable interest in the Zoono treatment / Zoono brands.

Summary:

Between September and December 2012, Zoono Group conducted trials of Zoono Z-71 Surface Sanitiser on behalf of a household name chicken producer. A condition of these trials was that all references to the identity or location of the growers was to be withheld and that no reference would be made to the client. Indeed, it was a condition of the trial that this Case Study was reviewed by the client prior to release.

The trial was spread across three different locations housing chicken broiler sheds (rearing sheds). The locations and sheds were selected to minimise any external influences (variations in sunlight levels, climatic variations, structure of the sheds, the size of the flock etc) – in an effort to deliver a robust 'like for like' comparison.

The results were conclusive – after three full cycles, there was a major reduction in the mortality rate of chickens within each facility and a marked increase in live weight – also at each facility. As there were no other changes in the feeding regime / no change in environmental factors, these improvements can only be attributed to the use of the Zoono Z-71 Surface Sanitiser product.

SUMMARY OF RESULTS

CHICKEN BROILER SHED TRIALS

(Cycle 1 of 3)

PHYSICAL LOCATION	LOCATION 'A'	LOCATION 'B'	LOCATION 'C'
TOTAL NUMBER OF SHEDS ON PROPERTY	20	16	24
SHED DIMENSIONS	90 X 30 Metres	80 X 25 Metres	90 X 30 Metres
TOTAL LIVESTOCK PER SHED / PER CYCLE	24,000	20,500	22,500
PRIOR TO ZOONO TREATMENT			
CURRENT MORTALITY AVERAGE / CYCLE	3,374	3,180	2,783
CURRENT MORTALITY PERCENTAGE / CYCLE	14.5%	16.6%	12.8%
AVERAGE LIVESTOCK WEIGHT (KGS)	2.43	2.33	2.65
ATP RESULT – LOCATION ON WALL	337	1294	109
ATP RESULT – DRINKING NOZZLE	209	82	88
ATP RESULT – 2ND LOCATION ON WALL	262	3363	417
ATP RESULT – LOCATION ON MAIN DOOR	428	2704	263
ATP RESULT – LOCATION ON FEEDER TRAY	122	305	116
ATP RESULT – CONTROL PANEL	477	883	371
AFTER ZOONO TREATMENT - DAY 42 OF CYCLE			
DURATION OF CYCLE (DAYS)	42	42	42
INITIAL ZOONO TREATMENT (DAY OF CYCLE)	-1	-1	-1
RE-TREATMENT (DAY OF CYCLE)	21	20	22
MORTALITY THIS CYCLE	1637	1709	1318
MORTALITY PERCENTAGE THIS CYCLE	6.82%	8.33%	5.86%
DECREASE IN STOCK MORTALITY	1737	1471	1465
MORTALITY RATE CHANGE (%)	-51.48%	-46.25%	-52.64%
AVERAGE LIVESTOCK WEIGHT (KGS)	2.55	2.42	2.74
IMPROVEMENT IN LIVESTOCK WEIGHT (%)	+4.94%	+4.72%	+3.39%
ATP RESULT – LOCATION ON WALL	75	114	63
ATP RESULT – DRINKING NOZZLE	48	63	37
ATP RESULT – 2ND LOCATION ON WALL	18	76	52
ATP RESULT – LOCATION ON MAIN DOOR	83	107	59
ATP RESULT – LOCATION ON FEEDER TRAY	36	72	28
ATP RESULT – CONTROL PANEL	82	64	40

SUMMARY OF RESULTS

CHICKEN BROILER SHED TRIALS

(Cycle 2 of 3)

PHYSICAL LOCATION	LOCATION 'A'	LOCATION 'B'	LOCATION 'C'
TOTAL NUMBER OF SHEDS ON PROPERTY	20	16	24
SHED DIMENSIONS	90 X 30 Metres	80 X 25 Metres	90 X 30 Metres
TOTAL LIVESTOCK PER SHED / PER CYCLE	24,000	20,500	22,500
PRIOR TO ZOONO TREATMENT			
CURRENT MORTALITY AVERAGE / CYCLE	3,374	3,180	2,783
CURRENT MORTALITY PERCENTAGE / CYCLE	14.5%	16.6%	12.8%
AVERAGE LIVESTOCK WEIGHT (KGS)	2.43	2.33	2.65
ATP RESULT – LOCATION ON WALL	66	72	49
ATP RESULT – DRINKING NOZZLE	33	47	31
ATP RESULT – 2ND LOCATION ON WALL	18	43	37
ATP RESULT – LOCATION ON MAIN DOOR	34	39	28
ATP RESULT – LOCATION ON FEEDER TRAY	28	27	32
ATP RESULT – CONTROL PANEL	33	41	39
AFTER ZOONO TREATMENT - DAY 42 OF CYCLE			
DURATION OF CYCLE (DAYS)	42	42	42
INITIAL ZOONO TREATMENT (DAY OF CYCLE)	-1	-1	-1
RE-TREATMENT (DAY OF CYCLE)	21	21	21
MORTALITY THIS CYCLE	1772	1826	1414
MORTALITY PERCENTAGE THIS CYCLE	7.38%	8.90%	6.28%
DECREASE IN STOCK MORTALITY	1602	1354	1369
MORTALITY RATE CHANGE (%)	-52.52%	-57.42%	-50.80%
AVERAGE LIVESTOCK WEIGHT (KGS)	2.51	2.44	2.72
IMPROVEMENT IN LIVESTOCK WEIGHT (%)	+3.29%	+4.71%	+2.64%
ATP RESULT – LOCATION ON WALL	57	48	44
ATP RESULT – DRINKING NOZZLE	59	72	83
ATP RESULT – 2ND LOCATION ON WALL	52	63	62
ATP RESULT – LOCATION ON MAIN DOOR	28	35	28
ATP RESULT – LOCATION ON FEEDER TRAY	79	60	84
ATP RESULT – CONTROL PANEL	33	55	36

SUMMARY OF RESULTS

CHICKEN BROILER SHED TRIALS

(Cycle 3 of 3)

PHYSICAL LOCATION	LOCATION 'A'	LOCATION 'B'	LOCATION 'C'
TOTAL NUMBER OF SHEDS ON PROPERTY	20	16	24
SHED DIMENSIONS	90 X 30 Metres	80 X 25 Metres	90 X 30 Metres
TOTAL LIVESTOCK PER SHED / PER CYCLE	24,000	20,500	22,500
PRIOR TO ZOONO TREATMENT			
CURRENT MORTALITY AVERAGE / CYCLE	3,374	3,180	2,783
CURRENT MORTALITY PERCENTAGE / CYCLE	14.5%	16.6%	12.8%
AVERAGE LIVESTOCK WEIGHT (KGS)	2.43	2.33	2.65
ATP RESULT – LOCATION ON WALL	108	83	94
ATP RESULT – DRINKING NOZZLE	78	99	78
ATP RESULT – 2ND LOCATION ON WALL	83	62	89
ATP RESULT – LOCATION ON MAIN DOOR	33	34	47
ATP RESULT – LOCATION ON FEEDER TRAY	97	106	93
ATP RESULT – CONTROL PANEL	37	48	52
AFTER ZOONO TREATMENT - DAY 42 OF CYCLE			
DURATION OF CYCLE (DAYS)	42	42	42
INITIAL ZOONO TREATMENT (DAY OF CYCLE)	-1	-1	-1
RE-TREATMENT (DAY OF CYCLE)	21	21	22
MORTALITY THIS CYCLE	1489	1533	1268
MORTALITY PERCENTAGE THIS CYCLE	6.20%	7.48%	5.63%
DECREASE IN STOCK MORTALITY	1885	1647	1515
MORTALITY RATE CHANGE (%)	44.13%	48.20%	45.56%
AVERAGE LIVESTOCK WEIGHT (KGS)	2.52	2.41	2.73
IMPROVEMENT IN LIVESTOCK WEIGHT (%)	+3.70%	+3.43%	+3.02%
ATP RESULT – LOCATION ON WALL	38	40	33
ATP RESULT – DRINKING NOZZLE	45	27	39
ATP RESULT – 2ND LOCATION ON WALL	64	51	57
ATP RESULT – LOCATION ON MAIN DOOR	30	33	31
ATP RESULT – LOCATION ON FEEDER TRAY	68	106	93
ATP RESULT – CONTROL PANEL	37	48	52