

**LAYER FACILITY ON THE FARM CHEZ NOUS  
NO 1775, KOPANONG MUNICIPALITY,  
FREE STATE PROVINCE**

**INTEGRATED PEST CONTROL  
MANAGEMENT PLAN**

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# INTEGRATED PEST CONTROL MANAGEMENT PLAN

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# INTEGRATED PEST CONTROL MANAGEMENT PLAN

## 1. INTRODUCTION

The Applicant, Tsiyon Boerdery (Pty) Ltd, applied for environmental authorisation for the operation of a layer facility for commercial egg production on a portion of the Farm Chez Nous No 1775, in the Kopanong Municipal Area of the Free State Province.

## 2. INTEGRATED PEST CONTROL MANAGEMENT PLAN BACKGROUND

Integrated pest management is defined as the effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices (Arnold, 2009). An integrated pest control management plan (IPM) identifies the most important pests associated with the proposed undertaking and highlights their interactions with the environment. This is then used to select the most appropriate pest control method with the least threat to people, property and the surrounding environment. It is important that all available pest management options, including the justifiable and judicious use of pesticides are considered.

Understanding pest survival needs is essential to implemented IPM effectively. Pests seek habitats that provide basic needs of moisture, food and shelter, meaning that pest pollutions can often be prevented or controlled by creating unfavourable environments. A pest management system must include the following elements whenever possible:

1. Identify the pests and their natural enemies;
2. Determine the tolerable pest population levels;
3. Prevent pest problems through improved sanitation, management of waste, addition of physical barriers, and the modification of habitats that attract or harbour pests;
4. Consider possible nontoxic, biological, cultural or mechanical pest management methods;
5. Use of chemical pesticides, when necessary, with preference for products that are the least harmful to human health and the environment; and
6. Establish an ongoing monitoring and record keeping system;

The IPM plan provides staff and management with a written document on integrated pest management procedures and policies for the facility. The plan must be treated as a living document that is continually updated as new pest situations and new procedures or activities within the facility arise.

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## 3. POULTRY PESTS

Darre and Rock define a pest as *an unwanted organism in your environment because it spreads disease, reduces productivity of the birds, wastes feed, destroys the buildings or is a nuisance to neighbours* (Darre and Rock). The following table shows the most common pests associated with poultry facilities:

Table 1: Most common pests associated with poultry facilities

PEST	HABITAT	IMPACT	NATURAL ENEMY
Beetles (mealworm beetle)	Terrestrial. Omnivorous scavenger, particularly in mouldy detritus.	Serious pest in poultry farms, adults and larvae abundant in litter. Vector of several avian diseases and parasites also of human pathogens. Burrowing larvae cause serious damage to structure, including insulation of poultry houses.	<ul style="list-style-type: none"> <li>✂ Lizards</li> <li>✂ Rodents</li> <li>✂ Spiders</li> <li>✂ Birds</li> </ul>
Cockroaches	Inside buildings, preferring warm and more humid locations.	Spread pathogenic organisms, transmitting bacterial diseases as well as eggs of parasites, emits allergens that cause allergic reactions such as asthma.	<ul style="list-style-type: none"> <li>✂ Frogs</li> <li>✂ Beetles</li> <li>✂ Geckos</li> <li>✂ Wasps</li> <li>✂ Snakes</li> </ul>
Fleas (stick-tight flea)	Common parasite of domestic fowls, also infects other birds and mammals.	Cause inflammation and discomfort and sometimes occur in such densities that they significantly reduce growth rate and egg production of hosts.	<ul style="list-style-type: none"> <li>✂ Snakes</li> <li>✂ Ants</li> <li>✂ Beetles</li> <li>✂ Spiders</li> <li>✂ Lizards</li> </ul>
Flies (white-footed lesser house fly)	Terrestrial, feeding on decomposing organic matter.	Important pest in poultry houses in South Africa. Transmitting disease and spoiling foodstuff.	<ul style="list-style-type: none"> <li>✂ Wasps</li> <li>✂ Geckos</li> <li>✂ Beetles</li> <li>✂ Mites</li> </ul>
Lice	Feeding on the birds. Feeding on skin scales and debris in the feathers.	Heavy infestations can cause feather pecking, weight loss, skin irritation, listless nature and decrease in egg production.	<ul style="list-style-type: none"> <li>✂ Pathogenic fungi</li> <li>✂ Pathogenic bacteria</li> </ul>
Mites (fowl mites)	Terrestrial, feeding on birds at night, retreating during the day into cracks and crevices of housing.	Heavy infestations can cause pale combs and wattles (due to anaemic birds), listlessness and decrease in egg production.	<ul style="list-style-type: none"> <li>✂ Thrips</li> </ul>

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PEST	HABITAT	IMPACT	NATURAL ENEMY
Rodents (rats, mice)	Largely confined to human settlements, normally indoors, but also adjacent to buildings, in disturbed areas and cultivated lands.	Despoiling crops and human foodstuffs. Host of several pathogens and parasites that may infect humans. Responsible for infrastructure damage by gnawing.	<ul style="list-style-type: none"> <li>⌘ Cats</li> <li>⌘ Snakes</li> <li>⌘ Birds of prey: owls, hawks, falcons</li> </ul>
Wild birds (sparrows, pigeons, doves)	Urban and developed areas and cultivated fields.	Diverse impact including fouling of buildings, potential transmission of disease, forages in animal feed lots.	<ul style="list-style-type: none"> <li>⌘ Cats</li> <li>⌘ Falcons</li> </ul>

## 4. PEST CONTROL METHODS

The goal of an IPM plan is to control pest numbers at an acceptable level, it is important to note that total eradication is an unrealistic goal for most farms. Site management must implement all the available management options to control pest numbers in an economically sound manner with the least disruption to the environment. Darre and Rock proposed five primary elements to the pest control process:

1. Detection;
2. Identification;
3. Economic significance;
4. Control method selection; and
5. Evaluation.

### 4.1 DETECTION AND IDENTIFICATION

Pest infestation must be detected before it becomes a problem, as this substantially lowers the control costs and cost of damage/loss, and increases effectiveness. Proper detection requires frequent and careful monitoring, a knowledge of the common pests and an ability to recognise potential problems. Detection is achieved through sampling devices and/or visual appraisals done at regular intervals.

The use of traps is a very effective manner to determine the presence, number and frequency of pests at the facility. Traps must be placed at controlled areas according to a floor plan of which proper record is kept. The monitoring chart should be filled out on a monthly basis. The best way to use the chart will be to collect all of the traps and assess their contents before deciding whether to replace them with a new trap.

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Positive identification of the organism is crucial prior to it being classified as a pest. Identification of the pest should be followed by an informed decision on the control of the species. The chart below outlines the important information to gather during monthly trap monitoring.

*Table 2: Example of a trap monitoring chart*

MONITORING CHART							
DATE	TRAP NO	EMPTY?	INSECT TYPE	LIFE STAGE	NO	REPLACE TRAP?	NOTES
	1						
	2						
	3						
	4						

The use of a standardised checklist will ensure uniformity in the inspection of the facility and detection of problem areas/species. Table 3 presents an example of such a checklist to be implemented at the layer facility.

*Table 3: IPM checklist to detect problem areas/species*

IPM CHECKLIST FOR THE CHEZ NOUS LAYER FACILITY	
<u>Exterior Structure</u>	Tick
Is there evidence of damage and debris caused by insects?	
Are there cracks/holes in the building structures?	
Are there gaps around windows/doors?	
Are there leaking water sources near the building?	
Is there waste disposal near the building?	

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<b>IPM CHECKLIST FOR THE CHEZ NOUS LAYER FACILITY</b>	
Is there vegetation or mulch placed against or near the building?	
Is there non-essential lighting near the building?	
Notes:	
<b><u>Interior Structure</u></b>	<b><u>Tick</u></b>
Is there evidence of damage and debris caused by insects within the building or within the collection itself?	
Are there cracks or holes in or around the walls, doors or windows?	
Is there food waste in undesignated areas?	
Are there moisture leaking or condensation around plumbing, windows, or climate control equipment?	
What are the ranges relative humidity and temperature throughout storage and exhibition areas?	
Is there excessive paper trash? Is paper trash removed frequently?	
Notes:	
<b><u>Manure Stockpile Area</u></b>	<b><u>Tick</u></b>
Does manure stay dry when stored in the designated area?	
Is there signs of insect infestation?	
Is the fly presence unnaturally high?	
Notes:	
<b><u>Poultry</u></b>	<b><u>Tick</u></b>
Is there evidence of insect activity on or around poultry?	
Does poultry seem healthy (visual inspection)?	

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<b>IPM CHECKLIST FOR THE CHEZ NOUS LAYER FACILITY</b>	
Is there increased scratching?	
Is there signs of increase feather loss?	
Is there a drop in egg production, increase listlessness or reduced food intake?	
Did poultry mortalities increase?	
Notes:	
<b><u>Yard</u></b>	<b><u>Tick</u></b>
Is the grass kept short and weeds controlled?	
Is there any sign of bird or rodent nests?	
Is there increased insect presence?	
Does water pool in areas on the yard?	
Is there litter laying around the yard?	
Is there spilled feed on the yard?	
Is the perimeter fence in tact? No holes in the fence?	
Notes:	

## 4.2 ECONOMIC SIGNIFICANCE AND TOLERANCE THRESHOLD

Control of the identified pests should only be considered when it is believed that economic or social damage will occur as a result of their presence. As mentioned earlier eradication of pests is not a viable option and site management therefor has to determine the tolerance threshold at which action is initiated for a given type of pest. The IPM coordinator must set the action thresholds in order to establish a level at which the application of pesticides is needed. In other words, it isn't the presence of a pest, but the exceedance of the pest population of the set action threshold that initiate the use of corrective measures. Determining tolerance or action thresholds

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along with response times is one of the key to a successful IPM plan. Table 4 provides one method of determining the tolerance threshold:

*Table 4: Example of a tolerance threshold determination chart*

<b>THRESHOLD DETERMINATION CHART</b>			
<b>DEFINE</b>	<b>NOTES</b>	<b>CONSIDER</b>	<b>NOTES</b>
What is the zero tolerance in terms of non-destructive pests?		To what degree is the activity affected by pest activity?	
What is zero tolerance in terms of destructive pests?		What cost and time can be allotted to IPM implementation?	
What is low tolerance in terms of non-destructive pests?		Consider the age and adaptability of the structures. What changes to the structures are feasible?	
What is low tolerance in terms of destructive pests?		Should an outside company be contracted or can the IPM program be handled in-house?	
What is moderate tolerance in terms of non-destructive pests?		All staff understands that they participate to in the IPM plan by reporting pest sightings and defects to the interior or exterior of the buildings to the IPM coordinator.	
What is moderate tolerance in terms of destructive pests		Staff agrees on the threshold determination.	

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## 4.3 CONTROL METHOD SELECTION

Once a pest problem was detected, identified and the economic and social implications understood the appropriate control method can be selected. Site management should consider both natural and applied control methods.

- ⌘ Natural controls are those that check or destroy pests without dependence on humans including naturally occurring predators, parasites and pathogens, topographical features, and climatic features.
- ⌘ Applied control includes cultural (good housekeeping that removes the incentive for habitation), biological, chemical, mechanical, and physical control.

The following table presents general control methods for pests identified in Table 1.

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Table 5: Control methods of common pests associated with poultry facilities

NB: The proposed control methods are only recommendations based on information available to the environmental consultant at the time. The environmental consultants employed at Greenmined Environmental are not registered pest control operators (PCO) and in the circumstances the site should ensure that the expert advice and opinion of a registered PCO is sought prior to the commencement and implementation of control methods pertaining to invasive species.

PEST		
MEALWORM BEETLE		
<b>NATURAL CONTROL</b>	Repair all water leakages to prevent water supply to beetles, clean spilled feed.	
<b>APPLIED CONTROL</b>	<b>CULTURAL</b>	<p>Combination of cultural practices and insecticides required.</p> <p>Cold weather (less than -1°C), and proper manure handling. Remove manure regularly from batteries, and as soon as possible from manure stockpile area to kill of adults and larvae. Keep the manure in stockpile area dry. If manure is composted, turn the compost several times to encourage multiple heatings to kill off adults and larvae.</p>
	<b>CHEMICAL</b>	Apply treatment year round. Apply pesticides directly to the manure as needed and residual sprays to the walls and rafters to prevent the beetles from infesting the insulation. Products such as Fendona and Tenopa can be considered.
	<b>MECHANICAL PHYSICAL</b>	Regular removal of stockpiled manure from the poultry facility. Keep a downtime of at least 2 weeks between flocks to completely clean and disinfect the buildings and equipment.

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PEST		
COCKROACH		
<b>APPLIED CONTROL</b>	<b>CULTURAL</b>	Remove all waste, and sources of feed and water for the pests from the outside perimeter of the building.
	<b>CHEMICAL</b>	Use of glue strips to locate large infestations. Products such as Goliath, Fendona and Tenopa can be considered.
	<b>MECHANICAL PHYSICAL</b>	Chalk to fill entry points, weather stripping on doors and window seals can be used to mechanically keep cockroaches out of.
STICK-TIGHT FLEA		
<b>NATURAL CONTROL</b>		Take steps to exclude flea vectors such as wild birds and rodents from the poultry house. Establish a thorough disinfection and treatment program for houses before a new flock is placed.
<b>APPLIED CONTROL</b>	<b>CULTURAL</b>	Take care not to introduce infected poultry to the facility.
	<b>CHEMICAL</b>	Products such as Fendona and Tenopa can be considered. Infected poultry can be treated with a solution of or dusted with Maldison. Treatment must also be extended to the building.

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PEST		
FLIES		
<b>APPLIED CONTROL</b>	<b>CULTURAL</b>	<p>Manure management is the key to fly control. If dry manure conditions, &lt;50% moisture, are maintained, manure will form a cone-shaped mound as it accumulates and only the fresh additions of manure at the peak of the cone will be suitable for fly breeding. Proper ventilation will help keep the manure dry. Although manure removal is often used as a fly-control method, the fly life-cycle must be broken for control efforts to be successful. Proper manure management reduces fly build up and maximizes the development of beneficial parasite and predator populations. Cleaning manure every two days from the poultry facility will drastically reduce fly breeding and a severe fly outbreak.</p>
	<b>CHEMICAL</b>	<p>Ensure insecticide rotation to avoid resistance. To control adult flies, make use of residual surface sprays. For best results spray only where flies regularly rest. Do not indiscriminately treat all wall and ceiling surfaces. Products such as Fendona and Tenopa can be considered.</p> <p>Also treat manure with infestations of pupae or larvae with an approved pesticide prior to removal and spreading on fields or stockpiling, to reduce the potential of moving the problem from inside the house to outside and then to neighbours.</p>
	<b>MECHANICAL</b> <b>PHYSICAL</b>	<p>Cover manure stockpile areas and keep the manure dry. Manure below 25% moisture and above 80% moisture will not support housefly breeding. Remove manure every one to two days from the poultry house and stored in a dry covered (use plastic sheeting) area to prevent fly build up. Composting of manure also kill the flies and larvae.</p>

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PEST		
LICE		
<b>NATURAL CONTROL</b>		Take steps to exclude lice vectors such as wild birds and rodents from the poultry house and prevent the movement omits from one farm to another on egg flats, racks or other equipment or people. Establish a through disinfection and treatment program for houses before a new flock is placed.
<b>APPLIED CONTROL</b>	<b>CULTURAL</b>	Clean up spilled feed before it attracts wild birds and rodents.
	<b>CHEMICAL</b>	Poultry can be dusted with a sulphur and rotenone powder or diatomaceous earth. Also extent treatment to the layer house.
RED MITE		
<b>NATURAL CONTROL</b>		Take steps to exclude mite vectors such as wild birds and rodents from the poultry house and prevent the movement omits from one farm to another on egg flats, racks or other equipment or people. Establish a through disinfection and treatment program for houses before a new flock is placed.
<b>APPLIED CONTROL</b>	<b>CULTURAL</b>	Clean up spilled feed before it attracts wild birds and rodents.
	<b>CHEMICAL</b>	Mites developed at least partial resistance to many chemicals and therefore prevention is better than cure. Treat poultry at night with a sulphur and rotenone powder. Also extent treatment to the layer house, through the use of a natural insecticide and/or diatomaceous earth.

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PEST		
<b>MECHANICAL</b>	Paint the woodwork with carbolineum and spray the house with a paraffin-soap emulsion or effective chemical, repeating the process 3-4 times at intervals of no more than a week.	
RODENTS		
<b>NATURAL CONTROL</b>	Rodents require three basics: food, water and harbourage. If one or more is missing the rodent population will remain small.	
<b>APPLIED CONTROL</b>	<p style="text-align: center;"><b>CULTURAL</b></p> <p>Sanitation and rodent proofing is essential in rodent control.</p> <p>Sanitation: removing the food, water and shelter from the rats and mice. Manage feed and water spillages and properly dispose of waste eggs, dead birds and waste. Keep grass and weeds mowed, to prevent insect growth and hiding places for rats and mice.</p> <p>Rodent proofing: Plug all holes in the building (other than air inlets) larger than 6 mm to prevent mice and rats from entering. Seal all foundation cracks. Check to see that fan louvers are properly working and close completely when the fan is not running.</p>	
	<b>CHEMICAL</b>	Use traps in small areas, and baits in larger areas. Products such as Storm and Ridak can be considered.
	<b>MECHANICAL</b>  <b>PHYSICAL</b>	Seal and cover, with wire mesh, all holes and cracks, around water pipes and drain spouts.

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PEST		
WILD BIRDS		
<b>NATURAL CONTROL</b>	As with rodents, wild birds also require the three basics of food, water and harbourage, and control of this will keep wild bird numbers low.	
<b>APPLIED CONTROL</b>	<b>CULTURAL</b>	Clean up feed spills and water accumulations outside the buildings and cut grass and weeds to prevent nesting.
	<b>CHEMICAL</b>	Not recommended.
	<b>MECHANICAL</b> <b>PHYSICAL</b>	Screen poultry house air inlets and open windows with wire mesh. Look for nests and roosting areas and remove them.

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## 4.4 EVALUATION

The pest control program must continually be evaluated. Evaluation methods can include counts of pests before and after treatment, comparative damage ratings, yearly comparisons of cost of pest control, records of pesticide use, etc. Once pests are under control, maintaining the level and continuing with the monitoring program becomes a continual management responsibility.

## 5. IPM IMPLEMENTATION

### 5.1 ROLES AND RESPONSIBILITIES

Communication among those involved in a pest management system is the key to success. The respective roles of everyone in the IPM plan must be identified and agreed upon, and with proper communication, more effective and less expensive protection of the site can be achieved with reduced risk to the environment and its occupants.

The following roles must be defined:

- ⌘ Decision-makers;
- ⌘ IPM Coordinator; and
- ⌘ Maintenance Staff.

*Table 6: Responsible persons at the proposed layer facility*

<b>CHEZ NOUS LAYER FACILITY</b>	
<b>Decision-maker</b>	Mr. M Hook
<b>IPM coordinator</b>	To be appointed by Mr Hook.
<b>Maintenance Staff</b>	The management of each layer house will be assigned to a house foreman. This employee will also be the responsible staff member to ensure the maintenance of the pest control measures at his/her layer house.

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## 5.2 MONITORING AND RECORD KEEPING

Continued thorough inspection of key areas combined with the evaluation of staff pest sighting reports are critical to a successful IPM plan. Inspections must identify potential pest harbourage areas, sanitation issues, and possible entry points for pests. Once a pest problem was identified and corrective measures implemented monitoring of the pest population levels must continue. The reporting of pest sightings, corrective actions implemented and current pest levels must be a constant administrative action to be managed by the IPM coordinator. The following inspection program is proposed at the Chez Nous layer facility for the duration of the operational phase:

*Table 6: Inspection program to be instigated at the proposed layer facility*

<b>PEST INSPECTION PROGRAM</b>			
<b>Area</b>	<b>Inspection frequency</b>	<b>Responsible person</b>	<b>Confirmed By (at least every 6 months)</b>
Exterior structures	Once a month	Maintenance staff	IPM Coordinator
Interior structures	Once a week	Maintenance staff	IPM Coordinator
Manure stockpile	Once a week	Maintenance staff	IPM Coordinator
Poultry	Once a week	IPM coordinator	
Yard	Once a month	Maintenance staff	IPM Coordinator

The IPM coordinator is responsible to continually update the IPM plan, conduct follow-up inspections and evaluate the effectiveness of the pest management strategies at the poultry facility. Evaluations must be documented and the plan updated to prevent mistakes or failures from recurring. The IPM plan is a dynamic, constantly changing document and it is the evaluation of IPM procedures that allows the IPM coordinator to improve the plan.

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## 6. REFERENCES

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