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NATIONAL CLEANER PRODUCTION CENTRE SA

NCPC
national cleaner production centre
South Africa

CONTRACT REPORT

QUICK-SCAN SUMMARY REPORT OF EARLY BIRD FARM OLIFANTSFONTEIN PROCESSING

A DIVISION OF EARLY BIRD FARM (PTY) LTD

086DG / HY7AGRO

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QUICK-SCAN SUMMARY REPORT
OF
EARLY BIRD FARM OLIFANTSFONTEIN
PROCESSING

A DIVISION OF EARLY BIRD FARM (PTY) LTD

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30 August 2007

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EXECUTIVE SUMMARY

Early Bird Farm Olifantsfontein Processing, a division of Early Bird Farm (Pty) Ltd which in turn is a subsidiary of Astral Operations Ltd, was selected as one of the case studies for the Cleaner Production Demonstration programme currently being hosted by the National Cleaner Production Centre (NCPC) of South Africa. The Early Bird Farm factory in Olifantsfontein, Midrand, was the entity that was assessed.

The aim is to gather data on the production and waste generated in order to identify areas where cleaner production can be applied to improve profitability and enhance the environment. This report presents the outcome of the assessment findings to date.

The company produces fresh and frozen whole chicken, fresh and frozen chicken pieces, chicken offal, and poultry feed meal. The other divisions of Early Bird Farm (Pty) Ltd such as transport, farms, and marketing are not part of the scope for the Cleaner Production assessment. Health and safety measures at the company are well enforced.

The water, energy, and waste streams were investigated, and a number of potential cleaner production options have been identified from the walk through assessments, which are documented below.

Options	Environmental Impact Reduction	Implementation
Decrease potable water usage	Potential reduction in effluent	Immediately
Refurbish effluent plant	Reduction in BOD and COD in effluent	As soon as possible. The belt press to be repaired and better control valves to be installed.
Improve efficiency of rendering plant	Improve water recovery	As soon as possible
Develop a waste heat recovery system	Use less coal in boilers and lower electricity consumption	A detailed study must be undertaken before any implementation

CONTENTS

1. PREFACE

This Cleaner Production Quick-Scan Summary Report of HAF (SA), was performed as part of an awareness and pilot NCP project out by the South African National Cleaner Production Centre (NCPC - SA). The NCPC was established in 2002 within the framework of UNIDO/UNEP[1] Cleaner Production Centres

The programme has been designed for the needs of companies ready to analyze and optimize their internal business processes with a view to developing Cleaner Production (CP) techniques and to implement Environmentally Sound Technologies. This will allow the companies to reduce both their operating costs and the environmental performance, thus increasing their productivity and competitiveness. The project provides opportunities for staff training and technical consulting. It is targeted at executives and technically skilled employees (such as managers with a special brief for environmental affairs).

Further information can be found on the internet www.ncpc.co.za. Before a company is analyzed in detail, a *Quick-Scan* is usually conducted. The Quick-Scan is a short analysis which assesses the quality of the crucial processes, material- and energy flows in order to identify the *potentials* for CP. I.e. with the Quick-Scan the process areas with good optimising potentials are found and a possible focus for further analysis can be defined. On the basis of the Quick Scan, the company will decide whether or not and in which process areas an in-depth analysis (the CP Assessment) shall be conducted.

2. PROCEDURE

The company Early Bird Farm (Pty) Ltd, represented through its General Manager, Mr Albie Muller, declared an interest in conducting a Quick-Scan performed in its premises as indicated by communication with the CSIR.

The Quick-Scan was performed at the company's plant in Olifantsfontein, Midrand, in the presence of the following persons.

From Early Bird Farm (Pty) Ltd.:

Mr Albie Muller – General Manager
Mr Robert Allman - Plant Engineer
Mr Joubert du Roubaix – Quality Manager

From the NCPC:

Mr Mano Ramreddi - Project Manager

[1] UNIDO – United Nations Industrial Development Organisation
UNEP – United Nations Environment Programme

Dr Johannes Fresner - FHBB Basel/Stenum
Dr Thomas Burki - FHBB Basel

Consultant Team Members:

Mr Woody Naicker - team leader
Ms Lusanda Thomas
Mr Henry Nuwarinda

The short analysis was performed in the following order:

1. In comprehensive discussions, the company Early Bird Farm (Pty) Ltd presented its range of products as well as its production methods and other business processes. The crucial parameters and environmental data of the company were identified and noted. The most important production processes including the relevant material flows and energy consumers were identified.
2. In a subsequent follow-up meeting with Mr Allman, questions from the consultant's team members were answered and clarity of some of the processes was obtained.
3. Where information was required but not available on the consultants visit, a qualitative discussion was made.

3. SHORT ANALYSIS

3.1 The Enterprise

The company Early Bird Farm Olifantsfontein Processing is a division of Early Bird Farm (Pty) Ltd which is a subsidiary in the Astral Food Group based in Johannesburg. The plant was started some thirty years ago. The company is domiciled at 10 Industry Road, Olifantsfontein, Midrand, South Africa. The company produces fresh and frozen chicken; frozen chicken pieces, chicken offal, and poultry feed meal. The other divisions of Early Bird Farm (Pty) Ltd such as transport, farms, and marketing are not part of the scope for the Cleaner Production assessment.

Earlybird Farm produces frozen, fresh and value-added chicken products to both the retail and food services sectors. Frozen primary and value added products are branded mainly under the Goldi brand, whilst fresh products remain under the Festive brand. The factory at Olifantsfontein processes approximately 200,000 chickens per day and produces 355 tones/day of chicken products and 22 tones/day of poultry feed meal. The factory employs some 1400 people, both permanent and contract, at the site with two shifts of 400 permanent employees per day. The plant operates on a two shift basis, 18 hours per day,

five days per week. Maintenance and cleaning is carried out on weekends. Cleaning is also done in-between shifts. Early Bird Farm (Pty) Ltd has a turnover of R2.5 billion per annum.

The suppliers are mainly Early Bird Farm broilers, a few smaller chicken farms, Crown National for brine, East Rand Plastic, New Era Packaging for boxes, Makong Packaging for polypropylene, General Distributors for clear bags, Tri-Star Plastic for pallet wrap, and LINPAC for fomo trays. Utilities are supplied by Eskom for electricity and Rand Water for potable water usage in the plant.

The customers include Festive Fresh Products, Goldi Chicken, Pick n Pay, Energy Oil and Meadow Feeds.

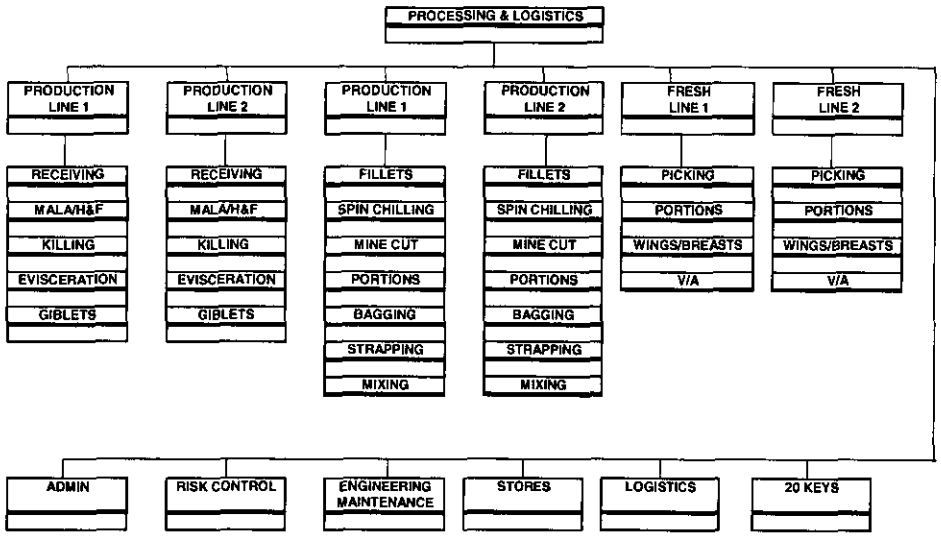
The company has an environmental philosophy that allows it to comply with most environmental standards. The company is audited quarterly, as per the South African regulation, by Alexander Forbes, and once a month for OHS audits. The company is also SABS 0330 and HAACP compliant. Early Bird Farm has initiated the ISO 22000 process with implementation by July 2007. There is also a health and safety management system implemented.

3.2 Manufacturing Processes

3.2.1 Overview

The process departments or sections of Early Bird Farm Olifantsfontein Processing are represented in figure 1.

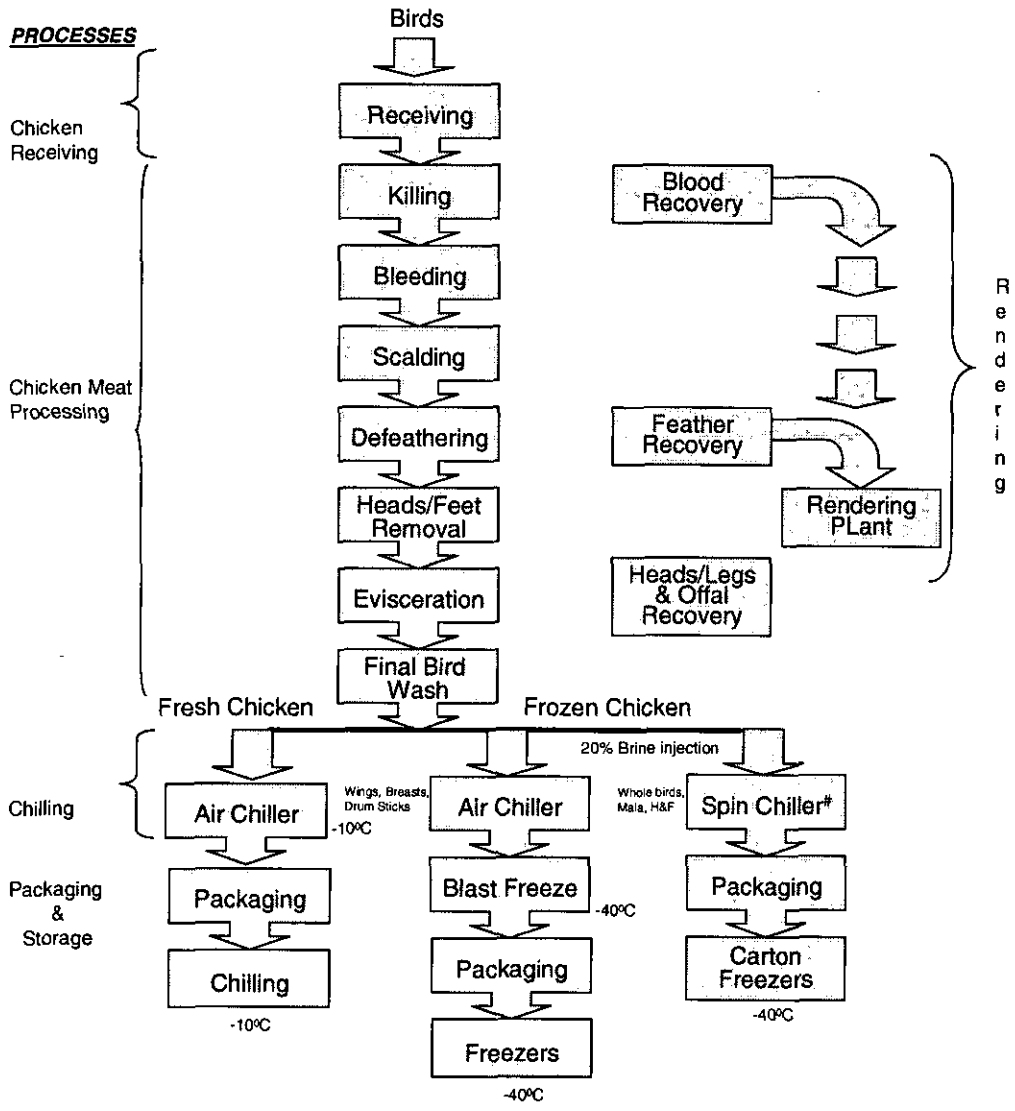
Figure 1: Overview of the various sections at Early Bird Farm Olifantsfontein Processing



The factory consists of two identical production lines till the chicken is separated into fresh and frozen whole birds and chicken pieces. The company is continuously improving and maintaining plant and equipment. For example, at the time of the Quick-Scan there were spin chillers operating, and by the time this report was written, air chillers were installed to replace the water consuming spin chillers. A 20 Key programme is being implemented by the company and a 20 Key team has been established.

3.2.2 Chicken Meat Processing

Figure 2: Process Flow Diagram at Early Bird Farm Olifantsfontein Processing



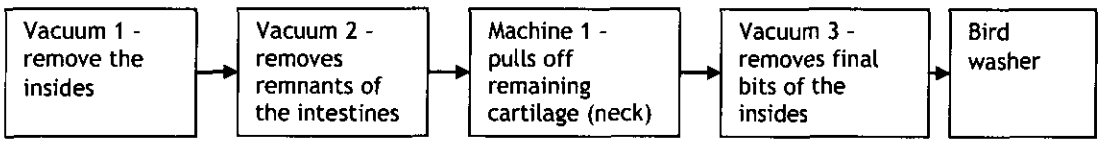
has been replaced by air chiller

The sections in the plant are Receiving, Chicken Meat Processing, Rendering, Chilling, and Packaging & Storage. In the receiving section, live birds in chicken coops are unloaded from incoming trucks and sent to the unloading area, where workers hook chickens by the legs onto shackles on the overhead Marel conveyor. The empty coops are then washed with potable water and sent back onto outgoing trucks. Hose-pipes are used to wash the floor area continuously. The birds on the conveyor move from the receiving area to the killing station at a prescribed rate where the birds are stunned, and their jugular vein slit by hand. Waste in the killing section is blood and feathers which end up in the wastewater. Blood is allowed to drain from the birds for about 1.5 to 2 minutes and sent to rendering.

The birds moving on the overhead conveyor are sent to a scalding bath where the water temperature is 520C and live steam is blown into the hot water. The birds spend approximately 2 minutes in the bath and then the feathers are removed in the defeathering machine. The amount of water used is dependent on the amount of feathers that need to be washed out of the machines. Feathers are sent to rendering.

The birds are then sent to the evisceration section where the first operation is the removal of the heads by fixed blades along the overhead conveyor. The feet are then manually cut off. The evisceration consists of exposing the viscera where the lungs, heart, liver, and gizzard are removed in one swift out. Then they pass through machine 2 where any remains are removed by suction. This was followed by a third machine that pulls off the remaining cartilage from the chickens. The last vacuum suction removes the final bits of the insides. After this process the chickens are washed inside and outside. The contents of lungs, heart, liver, and gizzard are also referred to as giblets.

Evisceration process

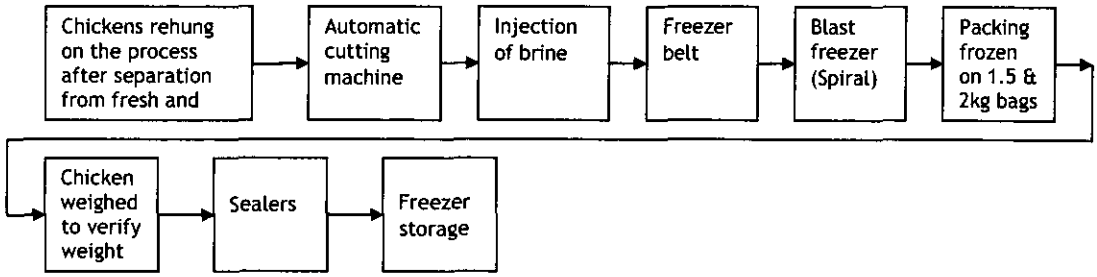


Wastes from the evisceration room consist of inedible viscera, crops and windpipes, heads, flesh trimmings, grit and sand from the gizzard cleaning, fat, blood, grease, etc. These wastes are generally termed offal and are carried from the evisceration room in the water that flows down the eviscerating trough. The water serves as a transportation system to remove wastes from the plant. There is a final wash after the evisceration section where remaining particles are removed from the bird's carcass. Water is discharged to wastewater. Offal is sent to rendering.

From the final wash, the birds for 'frozen products' are sent to spin chillers containing water and ice in tanks that are stirred mechanically (temperatures of 0 -1^{0}C). Brine is injected into

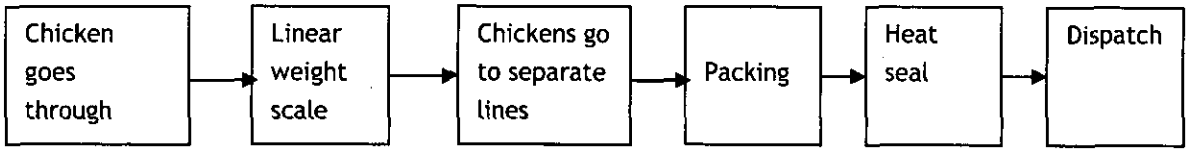
frozen products. Two spin chillers are used and consume 442t/d of water. These have, since the NCPC visit, been replaced with air chillers which will save the plant 442t/d water. During spin chilling, which decreases the bird's temperature, the bird absorbs between 6% to 12% moisture by weight. Water discharged from the spin chillers contain blood, fat, and flesh.

Frozen Department



The products for 'frozen' are then blast freezed to -400C and sent to packaging into 1.5 kg and 2 kg bags. They are weighed to verify mass and bags are sealed.

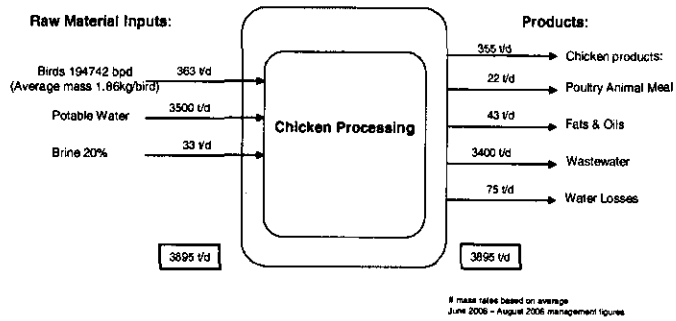
Fresh Department



The birds for 'fresh products' are sent to air chillers at -10^{0}C and then sent to packaging, put into bags, weighed and sealed

All wastewater is sent to the effluent treatment plant where fat is recovered and the partially treated wastewater is discharged to municipal mains.

The mass balance for the plant is illustrated below:



Current water consumption is 17.97 liters/bird. Water losses are very high at 75 t/d

3.2.3 Rendering

The feed to the rendering plant is all process waste, blood, offals, feathers, and floor waste. The feed enters a series of four cookers heated by 8t/h of 870kPa saturated steam. The product is poultry feed meal which is sold to Meadow Feeds. The feed breakdown is as follows:

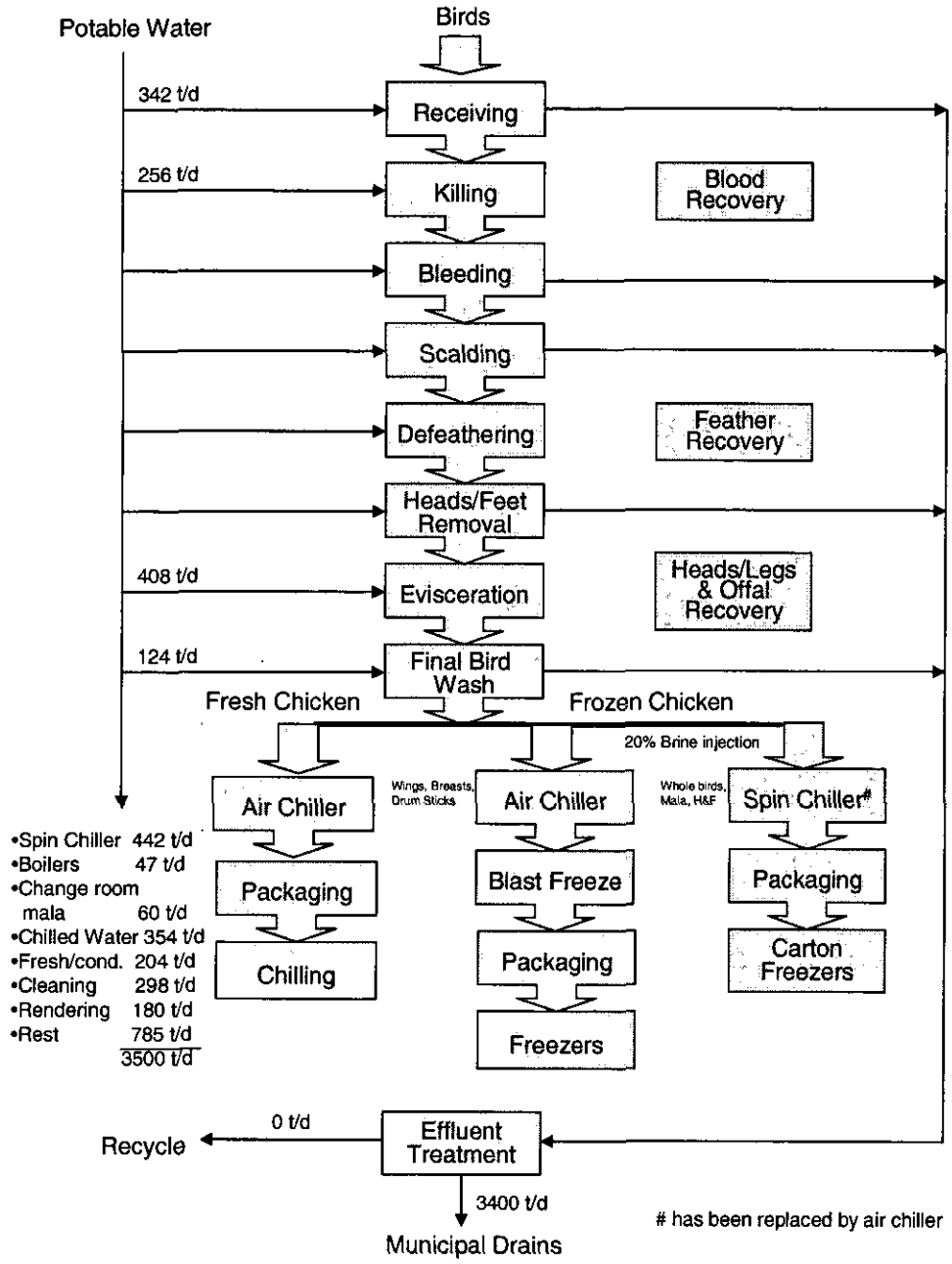
Component	%	t/d
blood	4%	14.51
feathers	5%	18.14
water	4%	14.51
lungs	1%	3.63
crop pipes	0.8%	2.90
gizzard cuts	0.8%	2.90
DOA	0.6%	2.18
floor waste	0.3%	1.09
gizzard fat	0.5%	1.81
mala & mala fat	0.3%	1.09
	17.3%	62.75

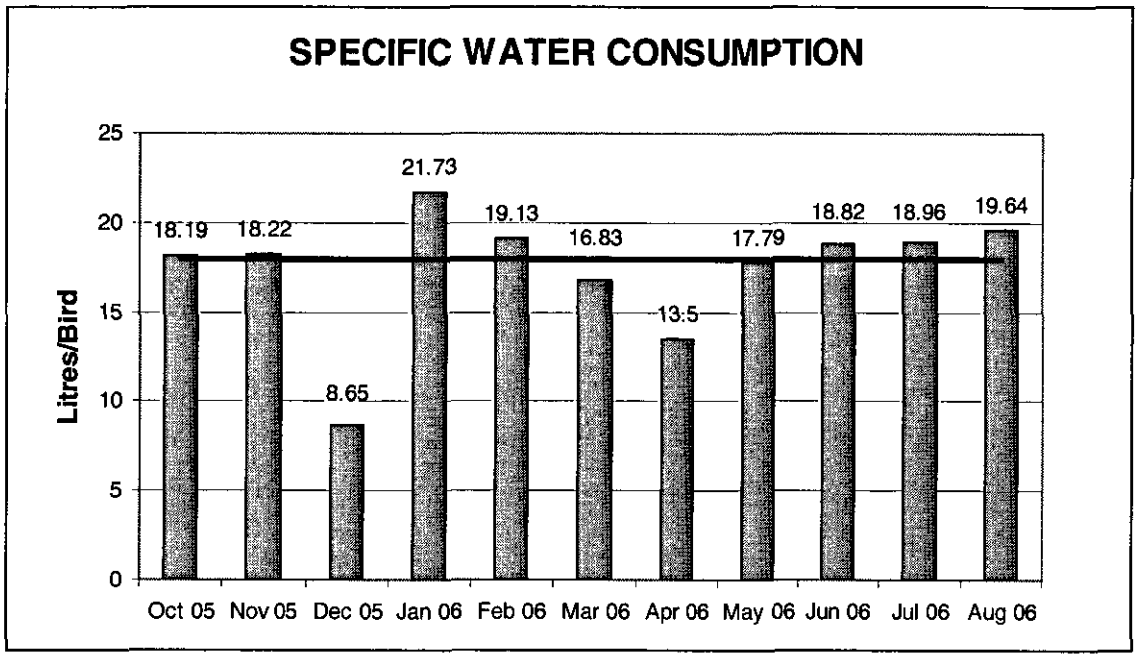
Almost 17% of a bird's mass is sent to rendering. The product meal from 63t/d of feed is 22t/d. The remaining 40t/d is water lost to evaporation. Not much is known by company personnel on any recovery of this vapour loss of 65%.

3.2.4 Potable Water & Wastewater Effluent System

The following diagram illustrates the use of potable water in the processing plant.

Figure 3: Water Flow Diagram at Early Bird Farm Olifantsfontein Processing

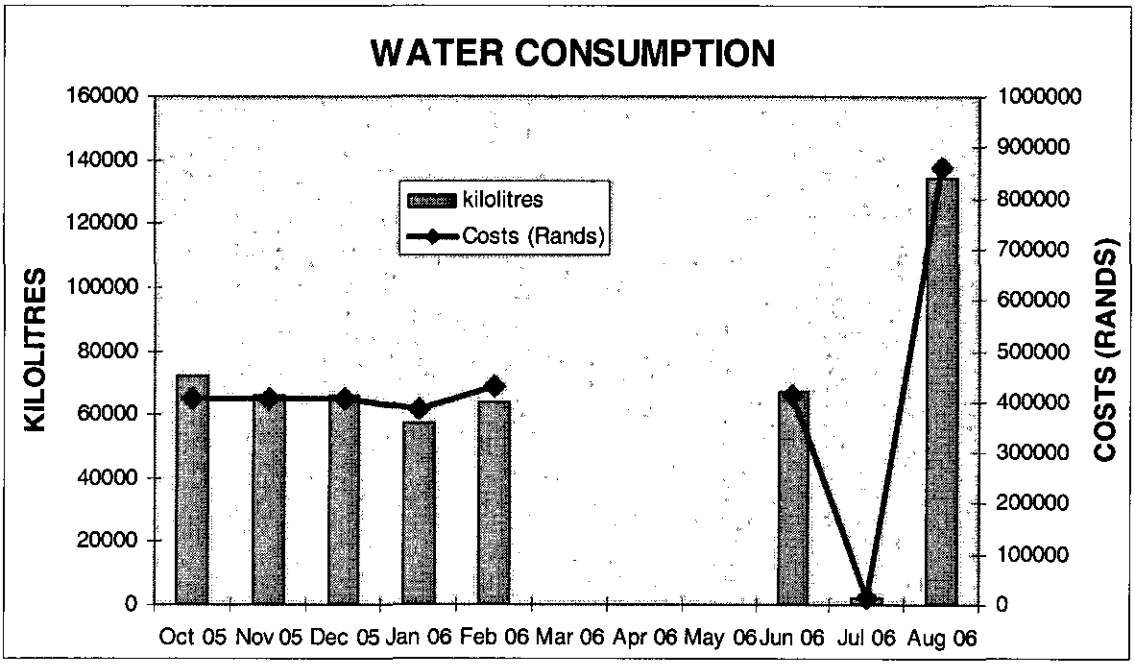




The high water usage can be ascribed to regulations governing the industry whereby any water coming into contact with meat must be sent to wastewater for treatment and discharged to mains. It does not allow for the re-use of treated water which would assist in decreasing water consumption. Possible water savings can be obtained by re-using treated condensate of 162t/d, use of air chillers saving 442 t/d, and 50% improvement in washing behaviour saving some 149 t/d. The total possible savings are 753 t/d translating into water consumption of 14.11 litres/bird which is close to best available techniques (BAT) as used in Denmark. The annual saving in water cost is R1.15 million at R6.40/kl.

The effluent plant processes some 3400 t/d of wastewater and warrants a base effluent charge of R150000 per month. The belt press in the effluent plant is not operational and makes the partially treated effluent to accrue a monthly penalty of R270800 resulting in a total monthly charge of R420800.

Water consumption for the factory is illustrated in the following graph. The average consumption was between 66000 and 69000 kilolitres per month with an average charge of R414936 per month.



	Oct 05	Nov 05	Dec 05	Jan 06	Feb 06	Mar 06	Apr 06	May 06	Jun 06	Jul 06	Aug 06
kilolitres	72110	66000	66000	57235	63835	N/A	N/A	N/A	67420	2162	134142
Costs (Rands)	406534	405772	405780	384781	429152	N/A	N/A	N/A	414156	14767	858545

The data for July 06 has been logged on for Aug 06, hence the disparity.

3.2.5 Environmental Relevant Substances

Gaseous Emissions – ammonia from compressors
Liquids – chlorine in spin chillers fats and organic matter in effluent

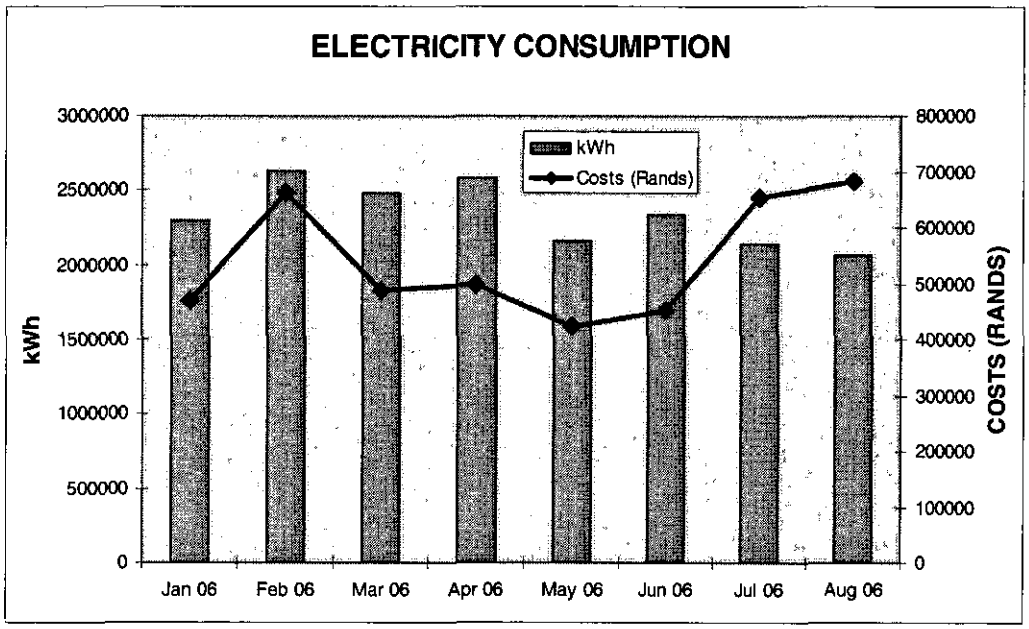
3.2.6 Energy Management

There is no energy management system in place for the plant and hence no energy accounting being practised. The integration of the entire energy system from boilers, condensers, refrigeration & chillers, waste heat, and preheat must be investigated and is an area for possible improvement and economic benefit.

3.2.7 Energy provision – Electrical energy

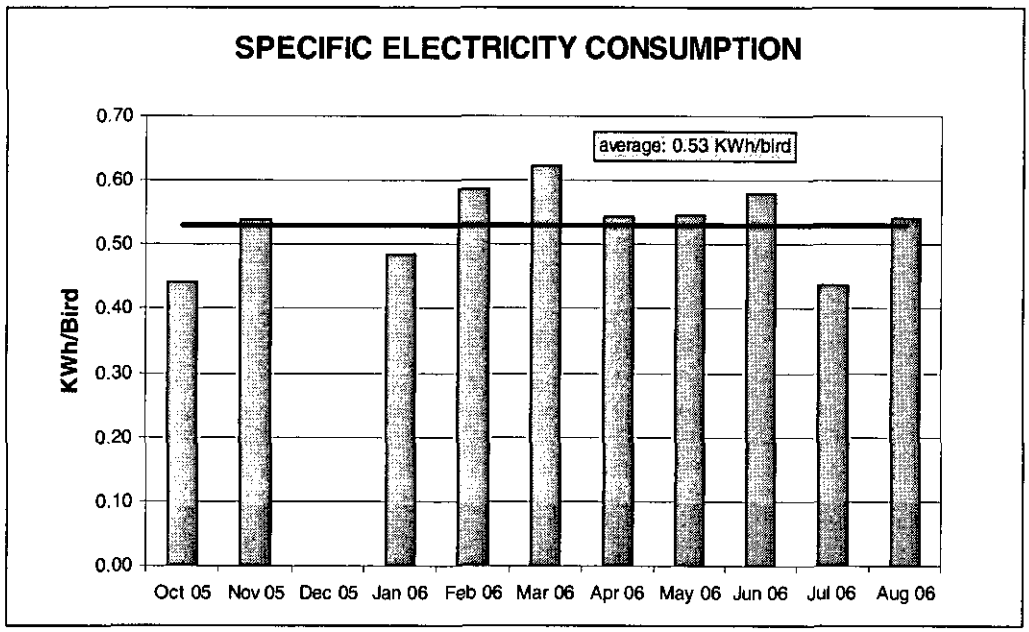
Early Bird Farm Olifantsfontein Processing consumes an average of 2176754 kWh per month at a cost of R553193. The consumers of this electricity are the refrigeration compressors, conveyors, processing equipment, packaging equipment, pumps, lights, and HVAC. The plant has a 5.1 MVA capacity but only uses 4.5 MVA from the main substation. A power correction factor is 0.99 is achieved.

The electricity consumption pattern is shown in the following graph.



	Jan 06	Feb 06	Mar 06	Apr 06	May 06	Jun 06	Jul 06	Aug 06
kWh	2299535	2629894	2482167	2578875	2161203	2336765	2143462	2065586
Costs (Rands)	470228	662569	487168	499794	422459	452782	655321	682211

Electricity costs increased from 16.4 cents/kWh in June 2006 to 27.6 cents/kWh in July 2006. Electricity cost increased in July 2006 despite the decrease in kWh consumed.



The electricity consumed per bird was on average 0.53kWh. The best available technique (BAT) indicates a figure of 0.36 kWh/bird for electricity consumption. There is still room for improvement for electricity consumed by the factory.

3.2.8 Energy provision – Process Heat

There are two boilers, a 10 t/h unit on standby which is switched off, and a 12 t/h which is utilised. Steam produced is 9 t/h at 870 kPa saturated and a temperature of 174^{0}C. The 10 t/h boiler is not the primary boiler because it is 20 years old and the control of output pressure is not as stable as the 12 t/h boiler. The steam load of the cookers in the rendering plant varies between 8 t/h to 10 t/h and makes the 12 t/h boiler suitable. The consumers of steam is the scalding process 1 t/h and rendering 8 t/h. Thermal consumption is 0.47 kWh/bird. Best available technique indicates 0.22 kWh/bird.

The compressors generate waste heat to the atmosphere. This could be used to preheat water for boilers or heat air for furnace combustion. The flue gas from the furnace is at 195^{0}C and is vented to atmosphere. This waste heat can also be utilised. Insulation on hot and cold vessels should be considered as some vessels exhibit freezing on the outside, eg: brine tank, chiller cold water tank.

3.2.9 Waste Generation

Waste Water

This has been discussed under the effluent plant section. High levels of Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) are produced in the effluent because of the high organic content. Waste water needs to be minimised and one of the critical opportunity areas.

Gas Emissions

The only gas emission that must be planned for is the accidental release of ammonia into the atmosphere. Ammonia is used in the refrigeration compressor system. Currently this section is separate and closed-off from the rest of the plant.

Dust Emissions

Feather dust and grit is washed down with water to prevent a dusty environment.

Packaging Material

Card board box and plastic wrapping and sacks are the main packaging materials. Approximately 1.94 t/d of waste is produced. All solid waste is removed by external contractor Multi-Waste.

3.2.10 Working Methods

Environment Policy of Early Bird Olifantsfontein Processing Factory

Early Bird has no specific environmental management system but has environmental guidelines and also follows the environmental philosophy laid down by "Astral Foods". There is recognition within Early Bird working environment that, the protection of the environment is essential for the long term survival of its business. With that in mind Early Bird has set standards that provide the necessary resources to minimise damage to the environment. There is an established target for each environmental objective and monitoring the progress to achieve these objectives in the Early Bird factory.

Early Bird strives to conduct regular environmental audits of all operations, develop contingency plans to cope with possible threats to the immediate environment especially in respect of waste disposal and to maintain an open and effective relationship on environmental issues with all interested and affected parties. Environmental matters in the factory are handled by Mr. Scott Moshatama, the Environmental Manager.

Early Bird is certified by the South African National Accreditation System (SANAS) i.e., SANAS 10330 that's recognised by the South African Government as the single national accreditation body and also certified by SABS 0330 and HAACP, with the hope to have acquired ISO 22000 accreditation by July 2007.

Health, Risk and Safety

The company has a health and safety committee that overlooks all the healthy and safety issues. It was reported that some employees suffer from health problems especially HIV. However, if a worker is HIV positive and TB symptoms begin to appear he/she is laid off for the sake of protecting the relevant interested and affected parties.

The rate of risk exposure that may affect the operation of and the extent to which they are being managed was presented in the June 2006 risk control report, and some of the identified risk exposures were;

- Need for self audit report which must be adequately documented.
- Need to maintain stacking heights as best as possible in the dry goods store.
- Need to keep escape door leading from fresh picking to the pallet bay area clear and unobstructed.
- Need for attention of the slippery floor that may result into back injuries.
- From the tour guide of the factory, it was established that some employees do not put wear ear plugs, masks and dust bubbles which, due to long exposure, may cause hearing and breathing problems.

From the monthly injury breakdown and the discussion with management, it is established that, the evisceration department has the highest injury cases of eyes, body, hand and foot injuries, whereas other departments have minor injuries that are dealt with more efficiently. However, of all the injuries that have occurred, none were fatal or led to disability of employees. While from the risk control report, in the month of August and September, no injuries were reported in the operation due to improved precautionary measures, to cut down the injury rate. The Factory is also HAACP certified.

4. FINDINGS OF THE QUICK SCAN

4.1 Data Evaluation: Estimation of CP Potentials

4.1.1 Assessment of processes

The data collected during the company visit were evaluated with the software-tool *Eco Inspector*. The CP potential of individual process steps, including those covering energy provision and storage management, was examined in accordance with the following criteria:

Inputs:
- Are there any problem materials which are hazardous to the environment or to health?
- Are large volumes of raw, auxiliary and operating materials used?
- Is the level of energy consumption high?
- Are major costs incurred on the input side (materials or energy)?

Outputs:
- Are large volumes of (problematic) waste, special waste, wastewater, wastewater components or emissions generated?
- Are high internal/external preparation and disposal costs incurred?

Technology:
- Is the applied technology state of the art?
- What is the level of automation?
- Are there losses incurred through faulty batches or scrap?
- How are the systems serviced or cleaned?
- Are high costs incurred for maintenance, cleaning, and stoppages?

Each process step was qualitatively checked on these criteria and was classified according to the following scale:

Table 1 Potential Points – Assessment of Potential Level for Each Criterion

Criterion not applicable to this process area, or no CP potential	Zero points
Moderate CP potential anticipated	1 point
Significant CP potential anticipated	2 points

The next step examines each sub-process as an entity according to the scale in Table 2 to determine the actual level of optimization already achieved; i.e. whether or not the CP potential is already exhausted. Thus the "relevance" of the identified potentials is described and a weighting factor is defined. This is a qualitative estimate and draws on the experience of the person conducting the Quick-Scan (expert opinion).

Table 2 Scale for Estimating the Level of Optimisation of the Current Process (weighting factor)

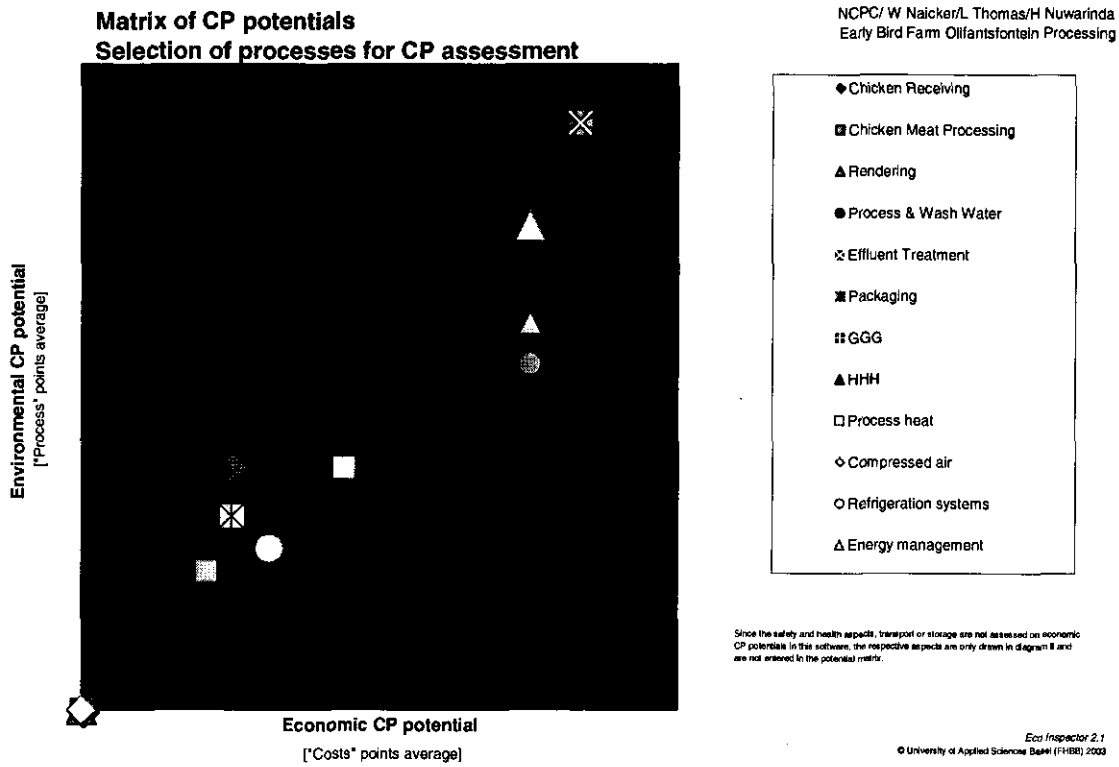
Level of optimisation "high"	Optimisation potential largely exhausted	0 Points
Level of optimisation "high to medium"		0.5 Points
Level of optimisation "medium"	Optimisation potential not fully exhausted	1.0 Point
Level of optimisation "medium to low"		1.5 Points
Level of optimisation "low"	Non-optimised process step	2.0 Points

The product of the potential point and weighting factor indicates the *current CP potential* for each criterion point of each sub-process.
The average of points for the individual categories (Inputs, outputs, technology and cost) gives a benchmark for the CP potential of individual process steps. This enables a rapid comparison of the sub-processes and facilitates selection of the processes for more detailed analysis.

4.1.2 Assessment of the S&H, material handling, transport and energy management aspects

The procedural principle for the processes is also followed when evaluating the aspects of safety, health, energy management, material handling, transport and storage. The points average gives a benchmark for the level of CP potential and is used as basis for decision to determine whether or not the relevant aspects are to be incorporated in a more detailed analysis.

4.2 Results



The effluent plant appears to exhibit the most potential for improvement from both the economic and environmental sides. The energy management, process & wash water, and rendering offer significant economic opportunities to be exploited.

4.3 Discussion of the Results

The cleaner production assessment highlights areas for improvement, and the partial operation of the effluent plant is a cost and environmental burden for the plant. Penalties are being paid for high BOD and COD wastes in the effluent.

The use of potable water is high at 17.97 litres/bird and this can be reduced significantly to below the budgeted 16 litres/bird.

The rendering plant produces only 22 t/d of product from 63 t/d of feed. There is a huge loss of water or vapour that is not accounted for in the data.

The use of waste heat is an opportunity loss, as the implementation of an energy management system will reveal huge economic and environmental CP potentials.

5. CLEANER PRODUCTION OPTIONS

- The use of potable water needs to be decreased substantially. The use of between 3 and 12 hosepipes out of a possible maximum of 25 hosepipes for washing consumes between 280 to 305 kl/day of water. The use of air chillers to replace spin chillers will decrease water consumption. The use of heated process water to wash crates will also decrease water consumption. The recycling of condensate to boiler to save water.

- The effluent plant has to perform fully as per the design case and discharge waste water to municipal mains that is of the right discharge quality such that only the base charge of R150000 per month is incurred. Lower water consumption will result in lower effluent costs.

- The rendering plant must be made more efficient in terms of yields of product and recyclable water & vapour.

- A waste heat recovery system needs to be investigated. Waste heat from flue gases, steam condensates, refrigerator condensers, and vessel insulation are all opportunities for cleaner production and economic benefits.

- Safety – employees must make use of ear plugs and masks for protection from noise, dust, blood, etc. Floors to be kept clean to minimise slippery floors.

6. RECOMMENDATIONS AND FOLLOW UP

- Use hosepipes sparingly and a focused drive to educate workers on the cost of water and wastage should be undertaken. A philosophy and culture of water management and saving needs to be created. Wash the external environment with less water. A saving of 50% on wash water should be expected.

- Water recycling should be investigated vigorously.

- Refurbish the effluent plant. This is an urgent measure and should require priority over most other capital spending. Savings of R3.2 million per annum will be generated.

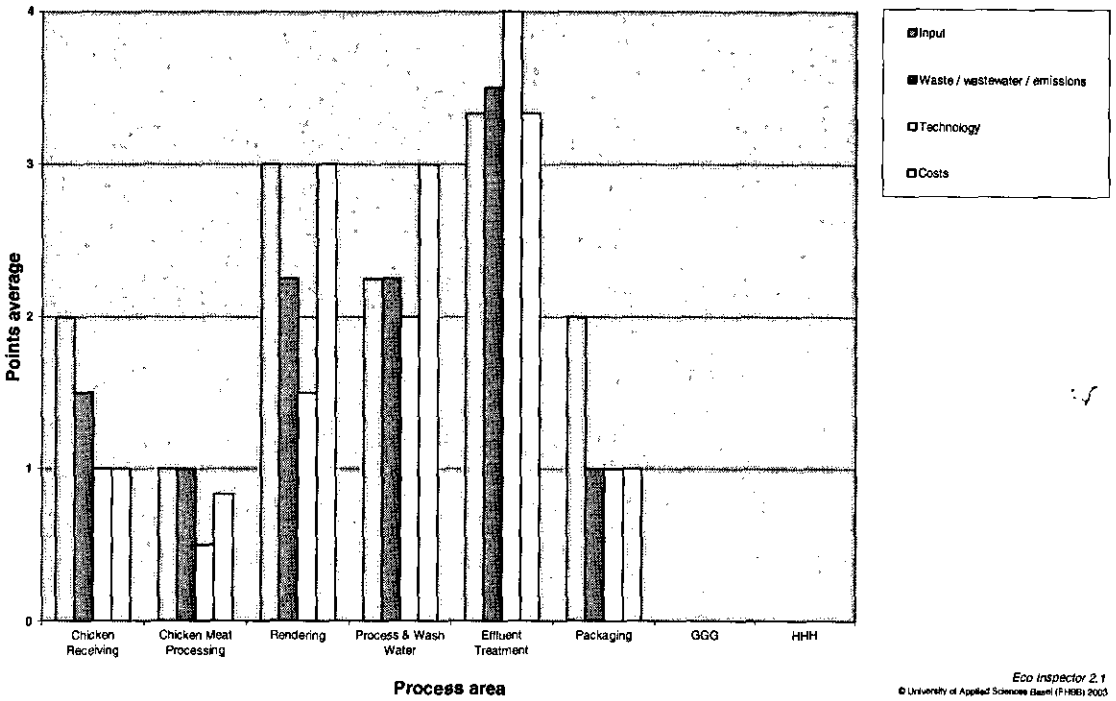
- A means to measure the material losses at the rendering plant should be investigated. This plant is currently using 8t/h out of the 9t/h steam produced.

- Waste heat recovery with regards to the practicality and economics should be investigated. An example is the possibility of using a heat exchanger on the scalder outflow in order to conserve energy.

APPENDIX 1 ESTIMATED POTENTIALS OF COMPONENT PROCESSES

Bar plot of CP potentials - sub-processes I

NCPC/ W Naicker/L Thomas/H Nuwarinda
Early Bird Farm Olifantsfontein Processing



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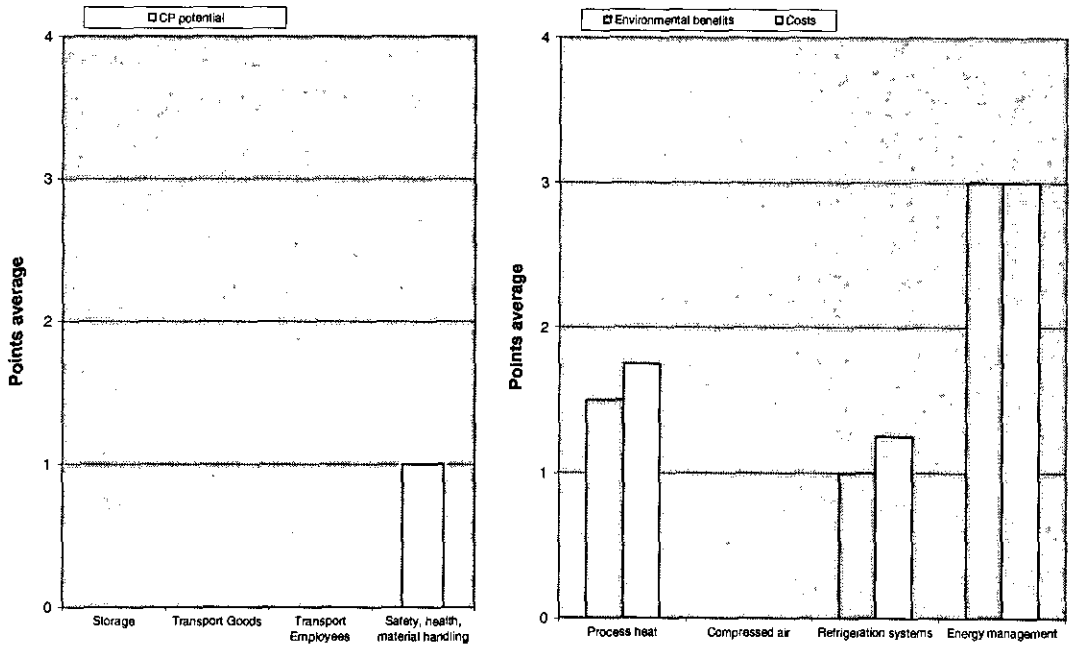
Bar plot of CP potentials - sub-processes II

NCPC/ W Naicker/L Thomas/H Nuwarinda
Early Bird Farm Olifantsfontein Processing



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APPENDIX 2 SUMMARY OF RESULTS

Summary of results Early Bird Farm Olifantsfontein Processing

NCPC Group 2

Process	CP potential environmental benefits (process)												CP potential economic benefits			Estimation of CP potential*			
	Input			Waste / wastewater / emissions					Technology				Costs						
	(Eco-) toxic problem materials	Raw, auxiliary, operating materials	Energy consumption	Solid waste	Special waste	Wastewater (flow, amount)	Wastewater components	Airborne emissions	Status of technology	Level of automation	Faulty batches, scrap	Maintenance, servicing, cleaning	Input materials, energy	Disposal, preparation	Maintenance, stoppages	Points average of environmental benefits (process)	Points average of economic benefits (costs)	Environmental CP potential **	Economic CP potential **
P1 Chicken Receiving	-	3	-	-	-	3	3	-	-	-	-	1.5	1.5	3	-	2.6	2.3	XX	XX
P2 Chicken Meat Processing	-	1	1	1	-	1	1	-	-	-	0.5	0.5	1	1	0.5	0.9	0.8	X	X
P3 Rendering	-	3	3	-	-	1.5	-	3	-	-	-	1.5	3	-	-	2.4	3.0	XX	XXX
P4 Process & Wash Water	-	3	1.5	-	-	3	1.5	-	1.5	1.5	3	-	3	3	3	2.1	3.0	XX	XXX
P5 Effluent Treatment	4	4	2	4	-	4	4	2	4	4	4	4	2	4	4	3.6	3.3	XXX	XXX
P6 Packaging	-	2	-	1	-	-	-	-	1	1	1	-	1	1	1	1.2	1.0	X	X
P7 GGG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	-	-
P8 HHH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	-	-
P9 Storage	No CP potential anticipated															0.0		-	
P10 Transport Goods	No CP potential anticipated															0.0		-	
P10 Transport Employees	No CP potential anticipated															0.0		-	
E1 Process heat	Moderate CP potential for environmental benefits or financial savings. Additional analysis of the process(es) 'heat provision' recommended.															1.5	1.8	XX	XX
E2 Compressed air	No CP potential anticipated															0.0	0.0	-	-
E3 Refrigeration systems	Low CP potential for more detailed analysis															1.0	1.3	X	X
E4 Energy management	High CP potential for environmental benefits or financial savings anticipated. More detailed analysis of the energy management system recommended.															3.0	3.0	XXX	XXX
Safety, health, material handling	Low CP potential for more detailed analysis															1.0		X	

* Estimation of CP potential

X	low CP potential	Points average "environmental benefits" or "economic benefits"	0.0	to	1.3
XX	moderate CP potential	Points average "environmental benefits" or "economic benefits"	1.3	to	2.7
XXX	high CP potential	Points average "environmental benefits" or "economic benefits"	2.7	to	4.0

** The value of "Process points average" corresponds to the environmental CP potential, the value of "points average of environmental benefits" corresponds to the "Economic potential"
The calculation of the points average covers all positions with a value. Positions without CP potential (value = "-") are not taken into account.

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