

# MONITORING REPORT

Methane capture and combustion from swine manure  
treatment for Peralillo  
Reference no. UNFCCC 0032

<p><b>Crediting Period to be verified: 1<sup>st</sup> June 2006 – 31<sup>st</sup> October 2006</b></p>
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**AGRICOLA SUPER LIMITADA**  
**Camino La Estrella No 401**  
**Rancagua, Chile**

**Tel:** 56-72-201 111  
**Fax:** 56-72-201 124

Contact Person:

Carlos Andrés Vives  
Corporate Environmental Manager  
[cavives@agrosuper.com](mailto:cavives@agrosuper.com)  
[www.agrosuper.com](http://www.agrosuper.com)

## **INTRODUCTION**

In December 2000, Agrícola Super Limitada (Agrosuper), the largest pork production company in Chile, initiated a voluntary process to implement advanced waste management systems (anaerobic and aerobic digestion of hog manure), in order to reduce greenhouse gas (GHG) emissions into the atmosphere.

The project consists of an advanced improvement to the common practice of swine waste treatment in the country, reducing an important volume of greenhouse gases. The technology implementation is based on the use of an anaerobic digester and an activated sludge treatment.

The anaerobic and aerobic digestion technology is being phased in gradually in some of Agrosuper's facilities. The goal is to eventually implement this technology to capture or avoid GHG emissions from all of the company's swine barns. However, this will depend upon the generation of revenues from the sale of Certified Emission Reductions (CERs), which will be used to partially finance the waste treatment systems.

Agrosuper initiated the first phase of the project in the year 2000 with the construction and operation of the first digester at Peralillo. Agrosuper owns the technology and the facilities.

The decision to consider the implementation of more expensive technology was influenced by the adoption of the Kyoto Protocol and the Clean Development Mechanism. The investment decision was further influenced by the confirmation as part of the Marrakech Agreement “...that a project activity starting as of the year 2000, and prior to the adoption of this decision, shall be eligible for validation and registration as a CDM project activity if submitted for registration before 31 December 2005. If registered, the crediting period for such project activities may start prior to the date of its registration but not earlier than 1 January 2000”.

The expected result from this project activity will be a significant reduction in the volume of methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emissions compared to those emissions that would otherwise occur in a scenario with traditional swine manure treatment systems.

*According to the approved methodology (AM0006), and based on a cost analysis, the baseline treatment system is represented by the use of open stabilisation lagoons (from now anaerobic lagoon) as the treatment process of liquid waste from swine production. Anaerobic lagoons lead to the direct release of CH<sub>4</sub>, N<sub>2</sub>O and CO<sub>2</sub> into the atmosphere as result of the anaerobic digestion process that takes place inside the lagoons. Anaerobic lagoon treatment process should be considered as the current national baseline for the agricultural sector, as will be detailed later in this document.*

## **STATUS OF THE PROJECT**

The following Table shows the dates in which the project started its operation

**Table 1**

<b>Project</b>	<b>Treatment system type</b>	<b>Size of treatment system, volume (m<sup>3</sup>)</b>	<b>Irrigation project</b>	<b>Starting date of the treatment system</b>
Peralillo (1 <sup>st</sup> phase)	Heated Digester	37,000	Yes	1/12/2000
Peralillo (2 <sup>nd</sup> phase)	Inclusion of Activated Sludge	Anoxic tank of 6,000 m <sup>3</sup> and aeration tank of 18,600 m <sup>3</sup>	Yes	13/01/2004

**STATEMENT TO WHAT EXTEND THE PROJECT HAS BEEN  
IMPLEMENTED AS PLANNED**

The project has been completed as planned and described in the Project Design Document (PDD).

The project has been continuously operating since the entering into operation.

Apart from brief stops of the Plant for maintenance purposes, the project has been operating according to schedule and with the parameters mentioned in the PDD.

## **PARAMETERS MONITORED ACCORDING TO MONITORING PLAN**

In order to implement a precise and representative monitoring plan, Agrosuper has established a continual registration of each monitoring parameter as part of its Environmental Management System and its Quality Management System.

The following description details the operational and management structure developed for monitoring the emission reductions during the verification process:

<b>DATA VARIABLE</b>	<b>DATA UNIT</b>	<b>DATA ORIGIN</b>
Animal Population	Heads	Daily animal Stock and inlet program of pigs (Net inlet considering mortality). Information managed by Agrosuper
Average Weight of Animals	kg	Pavilion test and growing tendency curves. Information managed by Agrosuper
Manure Flow After Aerobic Treatment Stage	m <sup>3</sup> /day	This parameter is calculated with total inlet flow minus sludge volume.
Manure Flow Before Aerobic Treatment	m <sup>3</sup> /day	This parameter is monitored from a flow meter installed before the activated sludge.
Flow of Sludge from Aerobic Treatment	m <sup>3</sup> /day	Referential volume from sludge transportation requirements. Information managed by POCH Ambiental S.A.
5 days BOD in Manure after Aerobic Treatment Stage	mg/L	Activated Sludge monitoring registers, managed by POCH Ambiental S.A.
Total Nitrogen Content in Manure after Aerobic Treatment Stage	mg/L	Activated Sludge monitoring registers, managed by POCH Ambiental S.A.
Temperature of Manure after Aerobic Treatment Stage	°C	Activated Sludge monitoring registers, managed by POCH Ambiental S.A.
Biogas Flow Extracted by Digester	SCFM	Registers from the CLP. Information managed by Agrosuper
CO2 Concentration in Gas Flow	%	Registers from the CLP. Information managed by Agrosuper
Flare Efficiency	%	Design Combustion Efficiency, Provided by Perennial Energy

## **MONITORING PERIOD AND EMISSION REDUCTIONS**

The monitoring period goes from 01/06/2006 – 31/10/2006

The following table shows emissions for baseline scenario of Peralillo:

**Table 3. Baseline Emissions in Peralillo**

<b>Summary of baseline emissions</b> <b>For period comprehended between 2005 - 2006</b>		
<b>ton CO2eq</b>	<b>2005</b>	<b>2006</b>
JANUARY	Verified	Verified
FEBRUARY	Verified	Verified
MARCH	Verified	Verified
APRIL	Verified	Verified
MAY	Verified	Verified
JUNE	Verified	7.823
JULY	Verified	8.655
AUGUST	Verified	8.915
SEPTEMBER	Verified	9.164
OCTOBER	Verified	7.945
NOVEMBER	Verified	
DECEMBER	Verified	
<b>TOTAL</b>		<b>42.502</b>

The following table shows emissions for project scenario of Peralillo:

**Table 4. Project Emissions in Peralillo**

<b>Summary of project emissions</b> <b>For period comprehended between 2005 – 2006</b>		
<b>ton CO2eq</b>	<b>2005</b>	<b>2006</b>
JANUARY	Verified	Verified
FEBRUARY	Verified	Verified
MARCH	Verified	Verified
APRIL	Verified	Verified
MAY	Verified	Verified
JUNE	Verified	440
JULY	Verified	408
AUGUST	Verified	416
SEPTEMBER	Verified	421
OCTOBER	Verified	598
NOVEMBER	Verified	
DECEMBER	Verified	
<b>TOTAL</b>		<b>2.283</b>

Leakages from energy consumption are calculated multiplying the energy consumption (kWh/month) by the Emission Factor (0.469 tCO<sub>2</sub>eq/MWh) for SIC (“Sistema Interconectado Central”) grid, obtained from the PDD” Nueva Aldea Biomass Power Plant Phase 2 (Nueva Aldea Power Plant Phase 2)” registered on June 2th, 2006 (methodology ACM0006).

Calculations for activated sludge leakage energy consumption are calculated using energy consumption monitored monthly by Aguas y Riles.

For the digester, there is not any data of energy consumption monitored. In this case, instead of taking monitored data, energy consumption is estimated considering the installed power of the mixers (kW), a consumption factor, hours of agitation per day and number of mixers operating daily. Then, the sum of daily energy consumption for each month is multiplied by the Emission Factor (0.469 tCO<sub>2</sub>eq/MWh) for SIC grid.

Leakage estimation of leakage due to additional electricity consumption Peralillo

**Table 5. Consume electricity for Peralillo Digester**

Consume electricity for Digester PERALILLO KWh/mes For period comprehended between 2005 - 2006		
Kwh/mes	2005	2006
JANUARY	Verified	Verified
FEBRUARY	Verified	Verified
MARCH	Verified	Verified
APRIL	Verified	Verified
MAY	Verified	Verified
JUNE	Verified	14.502
JULY	Verified	14.986
AUGUST	Verified	14.986
SEPTEMBER	Verified	14.502
OCTOBER	Verified	14.986
NOVEMBER	Verified	
DECEMBER	Verified	
<b>TOTAL</b>		<b>73.962</b>

**Table 6. Leakage estimation electricity Peralillo Digester**

Leakage Electricity tCO <sub>2</sub> eq/mes Peralillo For period comprehended between 2005 - 2006		
Ton CO <sub>2</sub> eq	2005	2006
JANUARY	Verified	Verified
FEBRUARY	Verified	Verified
MARCH	Verified	Verified
APRIL	Verified	Verified
MAY	Verified	Verified
JUNE	Verified	7
JULY	Verified	8
AUGUST	Verified	8
SEPTEMBER	Verified	7
OCTOBER	Verified	8
NOVEMBER	Verified	
DECEMBER	Verified	
<b>TOTAL</b>		<b>38</b>

**Table 7. Leakage estimation electricity Peralillo Activated Sludge**

Leakage Electricity tCO <sub>2</sub> eq/mes Peralillo For period comprehended between 2005 - 2006		
Ton CO <sub>2</sub> eq	2005	2006
JANUARY	Verified	Verified
FEBRUARY	Verified	Verified
MARCH	Verified	Verified
APRIL	Verified	Verified
MAY	Verified	Verified
JUNE	Verified	134
JULY	Verified	133
AUGUST	Verified	126
SEPTEMBER	Verified	122
OCTOBER	Verified	115
NOVEMBER	Verified	
DECEMBER	Verified	
<b>TOTAL</b>		<b>630</b>



The following tables show the emission reductions during that period

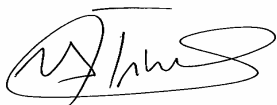
**Table 8. Emission Reductions in Peralillo**

Summary of emission reductions in Peralillo considered leakage electricity		
Ton CO2eq	2005	2006
JANUARY	Verified	Verified
FEBRUARY	Verified	Verified
MARCH	Verified	Verified
APRIL	Verified	Verified
MAY	Verified	Verified
JUNE	Verified	7.242
JULY	Verified	8.106
AUGUST	Verified	8.365
SEPTEMBER	Verified	8.614
OCTOBER	Verified	7.224
NOVEMBER	Verified	
DECEMBER	Verified	
<b>TOTAL</b>		<b>39.551</b>

**Table 9: Summary of all Emission reductions claimed for the period**

Ton CO2eq	1 <sup>st</sup> January 2006 – 31 <sup>st</sup> May 2006	1 <sup>st</sup> June 2006 – 31 <sup>st</sup> October 2006	Total
Peralillo		39.551	39.551
<b>Total</b>			<b>39.551</b>

On behalf of Agrícola Super Ltda.




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Carlos Andrés Vives  
Corporate Environmental Manager