

REPORT

TESTS OF APPLICATION OF PLOCHER TREATMENTS TO PORCINE BREEDING

TESTS CARRIED OUT IN SPANISH CATALONIA
WINTER 2005-2006



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1. INTRODUCTION

With the aim of identifying the effects of the use of "Plocher G, Plocher T and Wasserkat" during the pig fattening period, a comparative field test in actual size was carried out from December 2005 to the end of March 2006, in a pig breeding farm (see Annex 1) located in the Province of Barcelona – Spanish Catalonia – Orís "commune" in the Osona area.

In this region, the porcine concentration is very high and the cultivated areas very limited owing to the mountainous relief, with the consequent big problem of pig slurries surpluses.

The procedure was designed and the tests carried out by VILAMAJO & MIR, a Bureau of Biologists specializing in Slurry, Waste and Plague Treatments (see Annex 2).

The analysis were done by the Laboratory of the SART (Departement of Consultancy, Applied Research and Technology) from the University of VIC (Spanish Catalonia) which comprises a Microbiology Departement specializing in Slurries, Manures and Composts (see Annex 3).

1-1. Test description.

The selected fattening pig house is divided into 6 identical rooms for 110 animals in each one.

We used 4 rooms among the 6:

- **Room-1:** Application of **plocher-g** in the slurry pit (pre-tank).
- **Room-2:** Application of **plocher-g** in the slurry pit + setting a **wasserkat** on the drinking water pipe.
- **Room-3:** Application of **plocher-g** in the slurry pit + setting a **wasserkat** on the drinking water pipe + application of **plocher-t** by means of the drinking water.
- **Room-4:** Control room.

The application of **plocher-g slurry treatment** was made according to the standard protocol mixing the powder with water and pouring through the gratings.

The **wasserkat** was installed on the pipe which supplies the Rooms-2 & 3 with drinking water.

Owing to the fact that all the 6 rooms are food supplied by a unique couple of hoppers and a unique feeding circuit, the **plocher-t on dolomite** was supplied to the Room-3 through an independent drinking water circuit, equipped with a device normally used for medical treatments which comprises a "pulse pump" and a "constant stirring".

All the animals were of the same genetics, feeded with the same foods, and the same drinking water.

The tests were carried out from the date the animals entered the fattening rooms until their transfer to the slaughterhouse.

The tests performed were:

- Analysis of the chemical and microbiological characteristic parameters which allow to define the effects of the products.
- Analysis of gaseous emissions in situ by means of Gastec tubes (a device similar to Dräger tubes).
- Identification of the ability of reducing bad smells.
- Identification of the ability of homogeneizing and liquefying slurry.

1-2. Sampling description.

In order to carry out the above analysis, "in-column" sampling was done in each slurry pit (pre-tank) as shown in the figure below.

For that, we used a pipe with a diameter of 1.5 cm and a length of 2.2 m, so that we could introduce it vertically in the pit by the gap between two slats of the gratings and reach the bottom of the pit.

Before putting down the pipe in the pit, a metal rod with a length of 2.5 m was introduced in it. A rubber cork was fixed to the bottom end of the rod.

This device allowed us to "demarcate" a vertical cylinder of slurry, from top to bottom of the pit. By pulling up the rod, we so caught a column of slurry comprising all the phases in the pit.

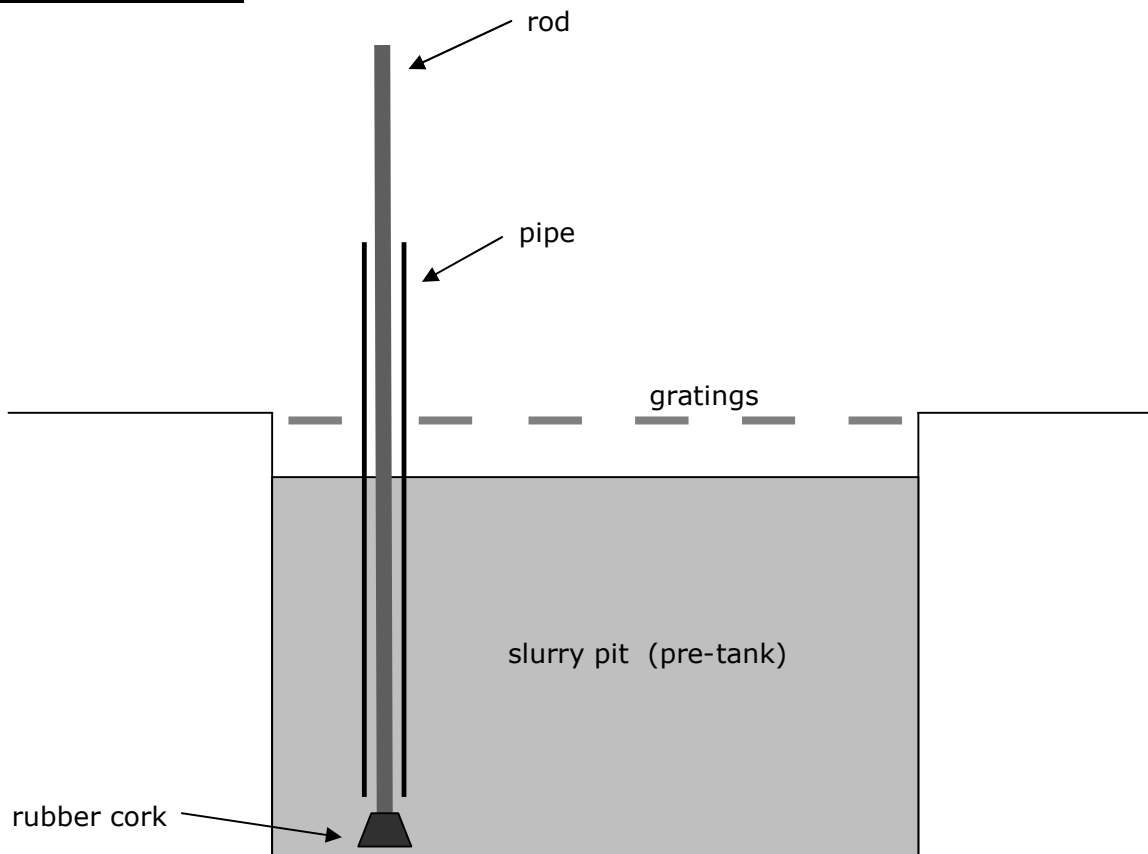
This operation was repeated several times until getting a 25 litre sample.

Then, after homogeneizing this sample by stirring it, 2 litres were taken for chemical analysis and 150 ml for microbiological analysis.

This operation was made in each room.

Note: A leakage at the Room-2 draining gate, owing to an operating mistake by the farm workers, left the corresponding pit without slurry.

SAMPLING DIAGRAM



1-3. Data sheets on Fattening Period.

The following tables show the relevant data on the management of each fattening room.

Room-1	
Date of birth	24/08/2005
Number of animals	105
Date of entry into fattening	13/12/2005
Mean weight on entering	45,94 kg
Date of exit	16/03/2006
Number of life days	204
Number of fattening days	93
Mean weight on exit	110,476
Mean Daily Weight Gain	0,69 kg/day
Death rate	0,00%
Mishaps	none

Room-2	
Date of birth	04/09/2005
Number of animals	106
Date of entry into fattening	23/12/2005
Mean weight on entering	44,55 kg
Date of exit	23/03/2006
Number of life days	199
Duration of fattening	90
Mean weight on exit	108,85
Mean Daily Weight Gain	0,71 kg/day
Death rate	0,00 %
Mishaps	2 animals went to the infirmary, and they were looked after in another place.

Room-3	
Date of birth	14/09/2005
Number of animals	105
Date of entry into fattening	23/12/2005
Mean weight on entering	37,17 kg
Date of exit	30/03/2006
Number of life days	196
Duration of fattening	97
Mean weight on exit	105,14
Mean Daily Weight Gain	0,70 kg/day
Death rate	0,00 %
Mishaps	none

Room-4	
Date of birth	21/09/2005
Number of animals	104
Date of entry into fattening	23/12/2005
Mean weight on entering	31,52 kg
Date of exit	06/04/2006
Number of life days	196
Duration of fattening	104
Mean weight on exit	97,80
Mean Daily Weight Gain	0,64 kg/day
Death rate	4 pigs 3,85 %
Mishaps	none

2. RESULTS AND COMMENTS.

2-1. Observations on Plocher treatment effects.

During the sampling operations and the draining of the pits we did observe a clear action of the Plocher products on two slurry perceptible characteristics:

- On the one hand, in the 3 treated rooms, the slurry was a lot more liquid and more homogeneous than in the control room.

The draining of the pre-tanks showed a liquid slurry, with a greenish color, always with the same thin texture without lumps neither blocks, allowing a perfect draining of the whole pit without leaving matter on the bottom.

This effect was even corroborated by the analysis which showed an increase of conductivity and alkalinity of the slurry in the treated rooms, meaning there has been a dissolving action on crusts and sediments.

- On the other hand, a clear deodorizing effect was detected in the treated rooms by farm staff, as well as by the biologists who made this study, and even by foreign persons to the farm and to the study.

This deodorizing effect is especially notable in the Room-3 treated with plocher-g, wasserkat and plocher-t.

Despite the obvious reality of this effect, it was not detected by attempts of measure in situ realized with Gastec tubes (similar to Dräger ones) for NH_3 , H_2S and CO_2 . These analyses would have to be done with completely different technics such as gaseous phase chromatography.

2-2. Chemical analysis results.

As already said above, from the chemical analysis we can infer that the microbial activity, stimulated by Plocher treatment action, dissolves the crusts (and sediments). Thus eliminating problems of storage capacity reduction and proliferation of flies.

This activity of dissolving solid phases is manifested by the increase of electric conductivity (dissolving of salts) and also the increase of alkalinity which is measured by the concentration of bicarbonates resulting from this microbiological activity.

The concentrations of solids, both volatile and suspended, are corroborating this conclusion.

With regard to nitrogen, we didn't observe any improvement nor change, whether considering concentrations or forms of nitrogen.

Nevertheless, a slight reduction of ammoniacal nitrogen and nitric nitrogen aims at a bacterial action which tends to make an anaerobic digestion of the slurry, and even to a point, a nitrification-denitrification process.

But nothing significant enough to be used as an argument in favour of the products.

With regards to concentrations of metals, the results are not significant, what is normal owing to the fact that these metals can change their forms but not their concentrations. The changes observed in Room-1 are due to a problem of sampling, not to a decrease of these elements.

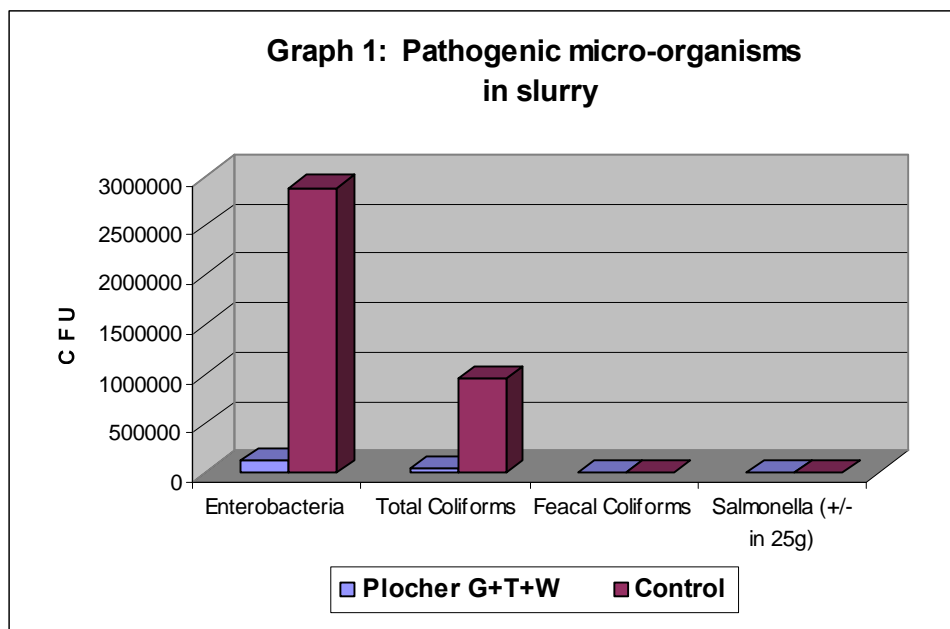
2-3. Microbiological analysis results.

This is the field where the action of Plocher products is the most conclusive without any doubt.

Pathogenic Bacteria	CFU Reduction
Enterobacteria	- 96 %
Total Coliforms	- 95,5 %
Faecal Coliforms	- 30 %

Indeed these reductions are very spectacular, but the most important is that, with Plocher treatment, the levels of pathogenic bacteria are under the limits that may be considered as danger thresholds.

Consequently, the action of Plocher products for slurry sanitizing is very effective.



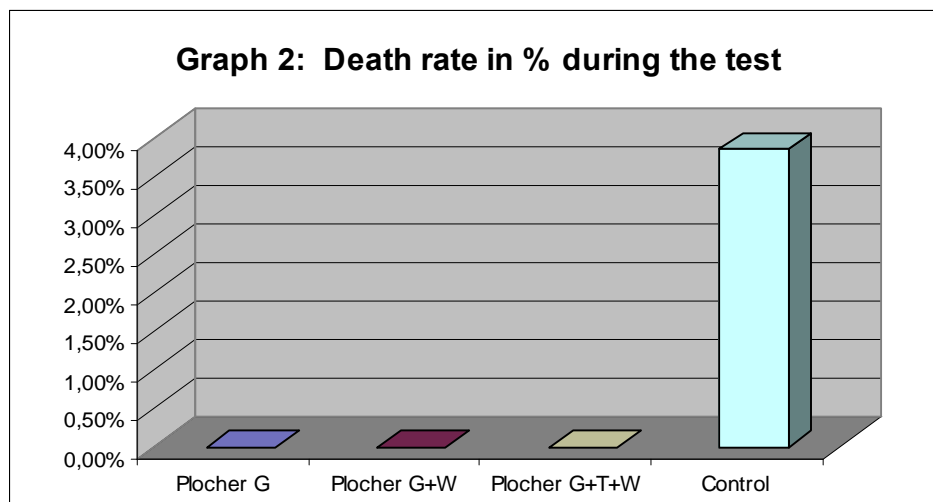
2-4. Observations on the animals.

From the observations of the animals it stands out two very important effects for a porcine farm:

A) Drastic reduction

4 deaths / 104 pigs in the Control room vs. 0 death / 314 pigs in the Treated rooms

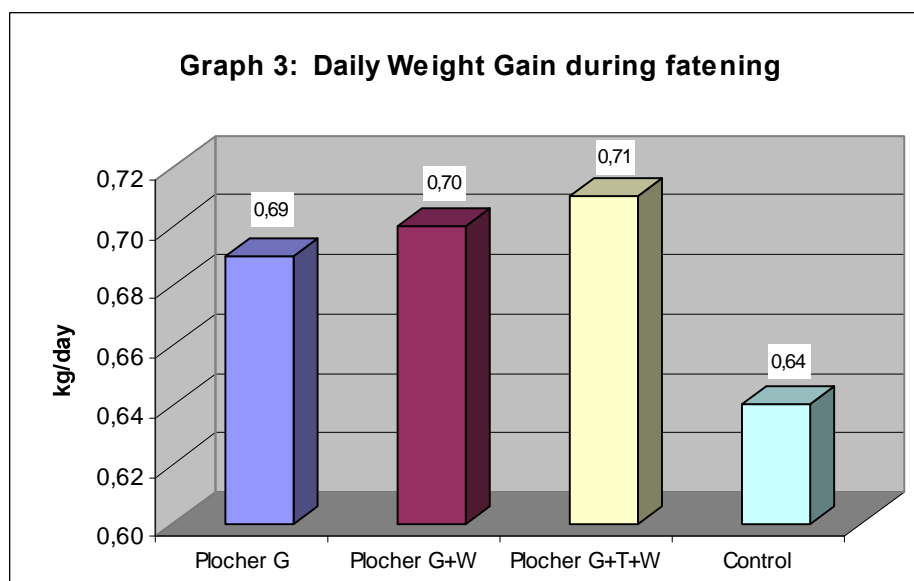
That confirms the sanitization capacity of the Plocher treatment, and the resulting improvement of the sanitary environment in the rooms.



B) Superior growing of the individuals living under Plocher treatment conditions.

In all the 3 treated rooms, a healthier environment with less stress by noxious gases can be the reason for the improvement of the Weight Gain.

The best result in Room-3 suggests that the Plocher-T has a positive effect on the metabolism.



2-5. Analysis Data Sheet.

PHYSICO-CHEMICAL PARAMETERS	UNITIES	RESULTS		
		ROOM-1 Plocher G	ROOM-3 Plocher G+T+Waserkat	ROOM-4 CONTROL
pH	-	7,33	7.44	7.34
Electric Conductivity	dS/m	38,8	42.6	38.3
Oxido-Reducción Potential	mV	- 412	- 423	- 417
Alcalinity	Meq/L	229	305	273
Volatile Fat Acids	Meq/L	286	353	350
Total Solids	g/kg	85.02	121.24	125.79
Volatile Solids	g/kg	61.83	87.37	91.17
Total Suspended Solids	g/L	36.48	55.00	59.58
Total Nitrogen Kjeldahl	gN/Kg	8.94	10.12	10.83
Ammoniacal Nitrogen	gN/Kg	6.10	6.86	7.06
Nitric Nitrogen	mg N/L	345.02	366.05	417.14
COD	g O2/L	108.91	146.04	145.42
Total Phosphorus	mg P/Kg	1285	1726	1809
Copper	mg Cu/Kg	10.88	17.18	17.34
Zinc	mg Zn/Kg	51.60	90.75	86.59
MICRO-BIOLOGICAL PARAMETERS				
Enterobacteria	CFU/g		120000	2885000
Total Coliforms	CFU/g		43660	949500
Feacal Coliforms	CFU/g		3000	10000
Salmonella (+/- in 25 g)	-		-	-

3. CONCLUSIONS

From the observations, mesures and assessments of all the results, it stands out that Plocher's treatments:

- Have a very good effect on the sanitary improvement of slurry, and consequently on the environment in the breeding farms, that reduces in a very significant way the presence of pathogenic germs.
- Have a very good effect as slurry deodorizing products.
- Have a very good effect as slurry liquefying and homogeneizing products, so that:
 - they make easier the handling (draining, pumping, spreading, etc.).
 - they maintain the storage capacity of the pre-tanks and storage tanks.
 - they can be used as additives to make things easier in later treatments for slurry management, needing such charactrerisitics.
- Have an important synergetic action, adding to the above qualities a yield improvement with regard to death rate reduction and growing increase.

In other respects:

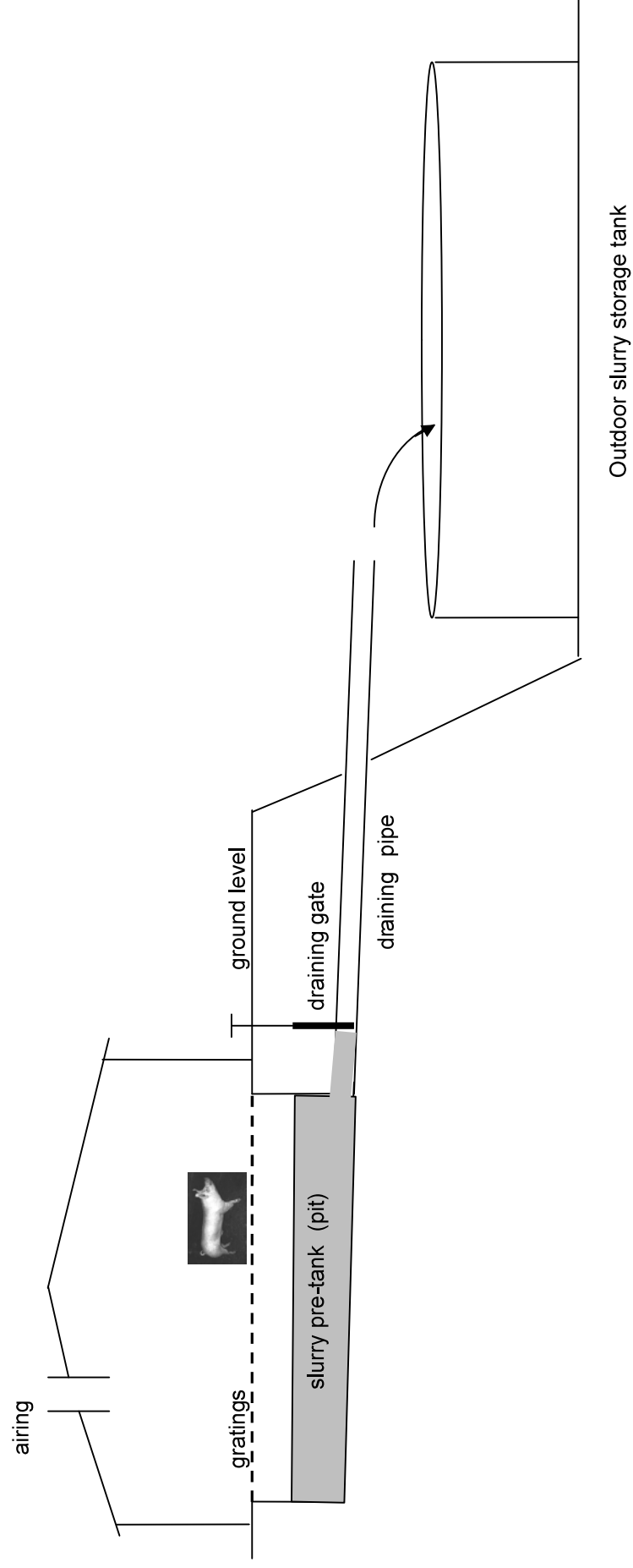
- Considering on the one hand the results of the chemical analysis,
- and on the other hand the ability of Plocher products to transform optional forms of micro-organisms into positive ones,

we consider that the lack of an oxygenation device in the pits is a limiting factor for the stimulated aerobic bacteria to work to their full potencial.

We think that the implementation of such an equipement would allow still better results.

■

PIG BREEDING BUILDING WITH GRATINGS AND PRE-TANK (PIT)



ANNEX 1

■ DATOS DE LA REALIZACIÓN DEL INFORME:

- Peticionario:

MEDIO AMBIENTAL NOVES SUSTEM'S, SL

Ronda Firal, 17

17160 – FIGUERES

NIF: B17793738

- Realización:

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Marc Vilamajó i Giol – Colegiado num. 20710-C

VILAMAJÓ i MIR, SCP

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Marc Vilamajó i Giol

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Aiguafreda, 20 de Octubre de 2006



Núria Mir i Puntí



Col·legi de
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Catalunya

RESULTATS ANALÍTICS

PETICIONARI

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MOSTRA

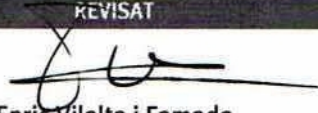
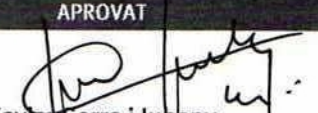
<i>Codi SART</i>	RR_01_210306	<i>Tipus de mostra</i>	Purí
<i>Codi Extern</i>	Nau 1 – G Room 1	<i>Data mostratge</i>	
<i>Data recepció</i>	21/03/06	<i>Presa de mostra</i>	Propis interessats
<i>Codi full entrada</i>	051-06	<i>Lloc mostratge</i>	
<i>Data inici anàlisis</i>	27/03/06	<i>Mètode mostratge</i>	
<i>Observacions</i>	No es va portar mostra per microbiologia		

RESULTATS

PARÀMETRES FÍSICOQUÍMICS	UNITATS	RESULTAT	METODOLOGIA
pH	-	7,33	Potenciometria
Conductivitat elèctrica (CE)	dS/m	38,8	Potenciometria
Potencial d'oxidació-reducció (Eh)	mV	-412	Potenciometria
Alcalinitat (ALC)	meq/L	229	Volumetria
Àcids grassos volàtils (AGV)	meq/L	286	Volumetria
Sòlids totals (ST)	g/kg	85,02	Dessecació a 105°C
Sòlids volàtils (SV)	g/kg	61,83	Calcinació a 550°C
Sòlids suspesos totals (SST)	g/L	36,48	Filtració (Ø 1,2 µm) i dessecació a 105°C
Nitrogen Kjeldahl total (NKT)	g N/kg	8,94	Digestió àcida, destil·lació alcalina i volumetria
Nitrogen amoniacal (N-NH ₄ ⁺)	g N/kg	6,10	Destil·lació alcalina i volumetria
Nitrogen nítric (N-NO ₃ ⁻)	mg N/L	345,02	ISE
Demanda química d'oxigen (DQO)	g O ₂ /L	108,91	Oxidació àcida amb dicromat i volumetria
Fòsfor total (P)	mg P/kg	1285	Digestió àcida i mètode de l'àcid ascòrbic
Coure (Cu)	mg Cu/kg	10,88	Digestió àcida i EAA
Zenc (Zn)	mg Zn/kg	51,60	Digestió àcida i EAA

Aquests resultats només donen fe de les mostres rebudes i processades en les dates indicades.

Aquest informe no podrà ser reproduït de manera parcial sense l'autorització dels laboratoris SART.

REVISAT		APROVAT	
			
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Document RR_01_210306

Data 07.06.06

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RESULTATS ANALÍTICS

PETICIONARI

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MOSTRA



Codi SART	RR_01_300306	Tipus de mostra	Purí
Codi Extern	Nau 3 G+K+W Room 3	Data mostratge	
Data recepció	30/03/06	Presa de mostra	Propis interessats
Codi full entrada	051-06	Lloc mostratge	
Data inici anàlisis	03/04/06	Mètode mostratge	
Observacions			

RESULTATS

PARÀMETRES FÍSICOQUÍMICS	UNITATS	RESULTAT	METODOLOGIA
pH	-	7,44	Potenciometria
Conductivitat elèctrica (CE)	dS/m	42,6	Potenciometria
Potencial d'oxidació-reducció (Eh)	mV	-423	Potenciometria
Alcalinitat (ALC)	meq/L	305	Volumetria
Àcids grassos volàtils (AGV)	meq/L	353	Volumetria
Sòlids totals (ST)	g/kg	121,24	Dessecació a 105°C
Sòlids volàtils (SV)	g/kg	87,37	Calcinació a 550°C
Sòlids suspesos totals (SST)	g/L	55,00	Filtració (Ø 1,2 µm) i dessecació a 105°C
Nitrogen Kjeldahl total (NKT)	g N/kg	10,12	Digestió àcida, destil·lació alcalina i volumetria
Nitrogen amoniacal (N-NH ₄ ⁺)	g N/kg	6,86	Destil·lació alcalina i volumetria
Nitrogen nítric (N-NO ₃ ⁻)	mg N/L	366,05	ISE
Demanda química d'oxigen (DQO)	g O ₂ /L	146,04	Oxidació àcida amb dicromat i volumetria
Fòsfor total (P)	mg P/kg	1726	Digestió àcida i mètode de l'àcid ascòrbic
Coure (Cu)	mg Cu/kg	17,18	Digestió àcida i EAA
Zenc (Zn)	mg Zn/kg	90,75	Digestió àcida i EAA

Aquests resultats només donen fe de les mostres rebudes i processades en les dates indicades.

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Data	07.06.06	Data	07.06.06



Sart

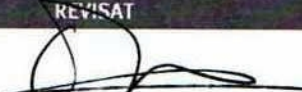

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RESULTATS ANALÍTICS

Room 3

PARÀMETRES MICROBIOLÒGICS	UNITATS	RESULTAT	METODOLOGIA
Enterobactèries	UFC/g	120000	Recompte en placa. Tècnica: VRB
Coliformes totals	UFC/g	43660	Recompte en placa. Tècnica: VRB
Coliformes fecals	UFC/g	3000	Recompte en placa. Tècnica: VRB MUG, EMB
Salmonella (+/- en 25 g)	-	-	Enriquiment. Tècnica: RAP/HEC

Aquests resultats només donen fe de les mostres rebudes i processades en les dates indicades.
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Data	07.06.06	Data	07.06.06



Sart

Document RR_01_300306
Data 07.06.06
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RESULTATS ANALÍTICS

PETICIONARI

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MOSTRA


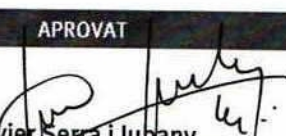
Codi SART	RR_01_080406	Tipus de mostra	Purí
Codi Extern	Nau 4 Control Room 4	Data mostratge	
Data recepció	08/04/06	Presa de mostra	Propis interessats
Codi full entrada	051-06	Lloc mostratge	
Data inici anàlisis	10/04/06	Mètode mostratge	
Observacions			

RESULTATS

PARÀMETRES FÍSICOQUÍMICS	UNITATS	RESULTAT	METODOLOGIA
pH	-	7,34	Potenciometria
Conductivitat elèctrica (CE)	dS/m	38,3	Potenciometria
Potencial d'oxidació-reducció (Eh)	mV	-417	Potenciometria
Alcalinitat (ALC)	meq/L	273	Volumetria
Àcids grassos volàtils (AGV)	meq/L	350	Volumetria
Sòlids totals (ST)	g/kg	125,79	Dessecació a 105°C
Sòlids volàtils (SV)	g/kg	91,17	Calcinació a 550°C
Sòlids suspesos totals (SST)	g/L	59,58	Filtració (Ø 1,2 µm) i dessecació a 105°C
Nitrogen Kjeldahl total (NKT)	g N/kg	10,83	Digestió àcida, destil·lació alcalina i volumetria
Nitrogen amoniacal (N-NH ₄ ⁺)	g N/kg	7,06	Destil·lació alcalina i volumetria
Nitrogen nítric (N-NO ₃ ⁻)	mg N/L	417,14	ISE
Demanda química d'oxigen (DQO)	g O ₂ /L	145,42	Oxidació àcida amb dicromat i volumetria
Fòsfor total (P)	mg P/kg	1809	Digestió àcida i mètode de l'àcid ascòrbic
Coure (Cu)	mg Cu/kg	17,34	Digestió àcida i EAA
Zenc (Zn)	mg Zn/kg	86,59	Digestió àcida i EAA

Aquests resultats només donen fe de les mostres rebudes i processades en les dates indicades.

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Data	07.06.06	Data	07.06.06




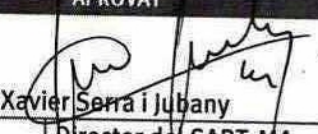
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Pàgina	1/2

RESULTATS ANALÍTICS

Room 4

PARÀMETRES MICROBIOLÒGICS	UNITATS	RESULTAT	METODOLOGIA
Enterobactèries	UFC/g	2885000	Recompte en placa. Tècnica: VRB
Coliformes totals	UFC/g	949500	Recompte en placa. Tècnica: VRB
Coliformes fecals	UFC/g	10000	Recompte en placa. Tècnica: VRB MUG, EMB
Salmonella (+/- en 25 g)	-	-	Enriquiment. Tècnica: RAP/HEC

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REVISAT		APROVAT	
			
Càrrec	Coord. laboratoris SART	Càrrec	Director del SART-MA
Data	07.06.06	Data	07.06.06