

ANAEROBIC DIGESTION



PILOT PLANTS AND FARM EXPERIENCES IN IN ARGENTINA

INSTITUTE OF RURAL ENGINEERING

NATIONAL RESEARCH CENTER CASTELAR

<http://www.inta.gov.ar/iir>





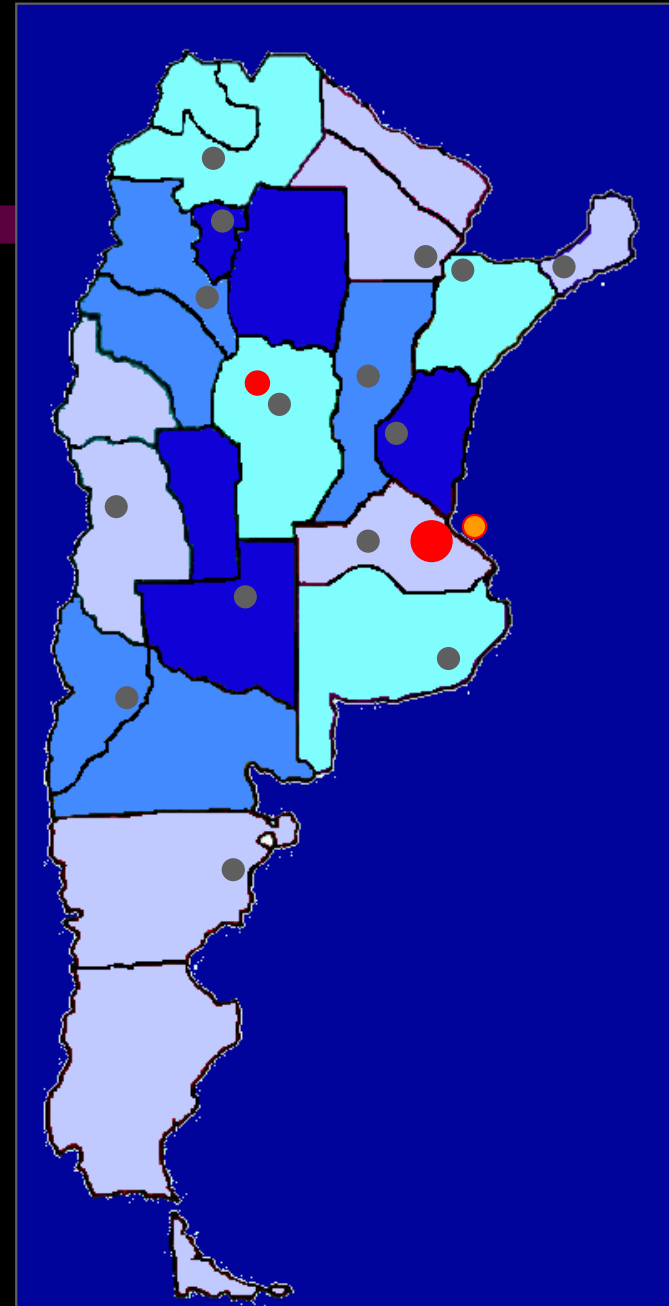
ESTRUCTURA ORGANIZACIONAL

- Sede Central ●
- 15 Centros Regionales ●
- 47 Estaciones Experimentales
- 3 Centros de Investigación ●
- 13 Institutos de Investigación ●
- 240 Unidades de Extensión
- 9 Parques de Innovación Tecnológica
- Entidades del Grupo INTA:

Fundación ArgenINTA

INTEA S.A.

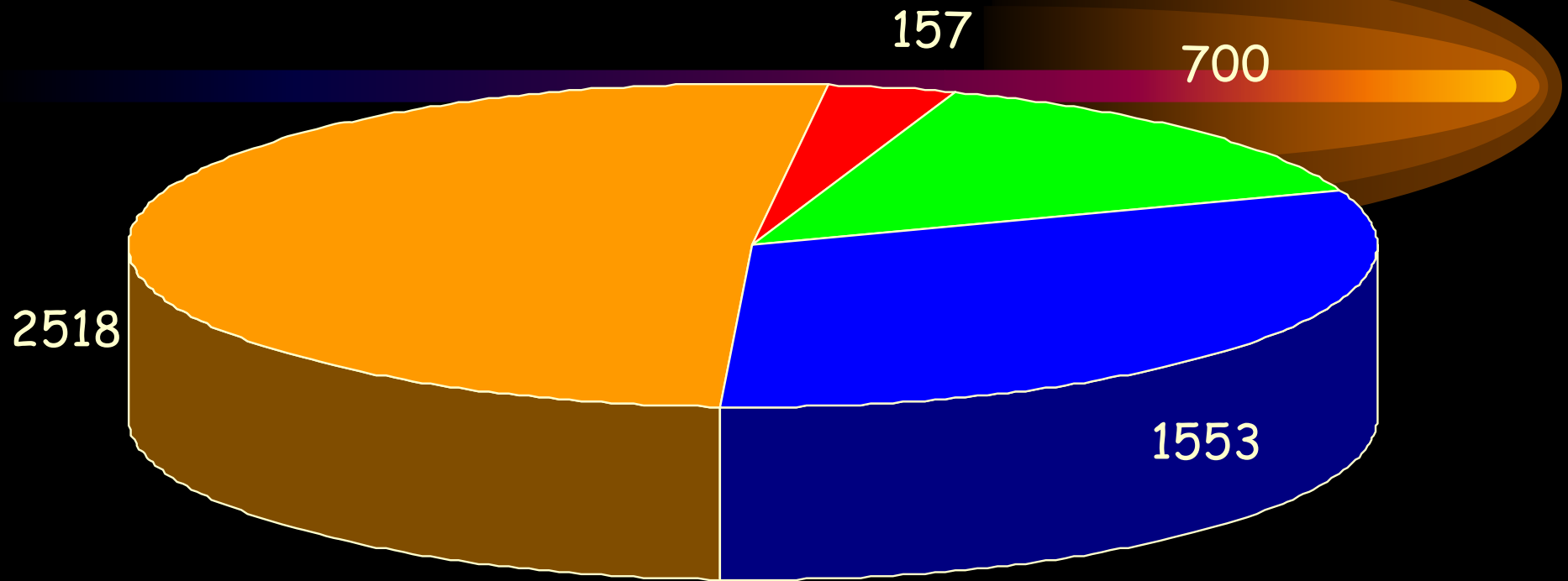
Asociaciones Cooperadoras





DOTACIÓN DE RECURSOS HUMANOS

Composición



Total 4928

- Profesionales
- Personal Apoyo
- Becarios
- Profesionales Externos

El 41% de los profesionales INTA posee nivel de postgrado (maestría/doctorado)





Biogas in Argentina

- 1940 -1980
 - Local employment of biogas produced in the Parana Delta
 - 80 Imhoff and other anaerobic sewage treatment plants with a total potential production of 14.000 m³/month distributed in several big and medium cities all over the country

Biogas in Argentina

- 1980 –1990
 - Research groups in
 - Castelar INTA agricultural wastes
 - Rosario CEFOBI aquatic plants
 - Tucuman Est.Obispo Colombres. Alcohol production wastes
 - Projects with FUNDS of sec. of Science & Technology.
 - National and local intensive human resource formation.
 - Pilot extension programs (Misiones, Corrientes, Catamarca). 26 rural digesters constructed
 - Pilot plants agricultural and agro industry sectors.
 - Cooperation FAO network Chile, Uruguay Paraguay and Brazil

Biogas in Argentina

- 1990 –2004
 - Low oil prices.
 - Research groups were dissolved
 - Low environmental incentives
 - Postgraduate courses Bariloche foundation
 - New agro industrial developments
 - Modern sewage treatment plants with European technology.
 - Industrial and rural urban designs Univ. Del Litoral
 - E.Gropelli**
 - Project of Americas fund with ArgenINTA 2004
Castelar

NEW INTERNATIONAL CONCERN

1928 -UPSALA GLACIER, PATAGONIA, ARGENTINA *Historic image* 1928.

©Archivo Museo Salesiano



January 2004 -UPSALA GLACIAR, PATAGONIA, ARGENTINA.



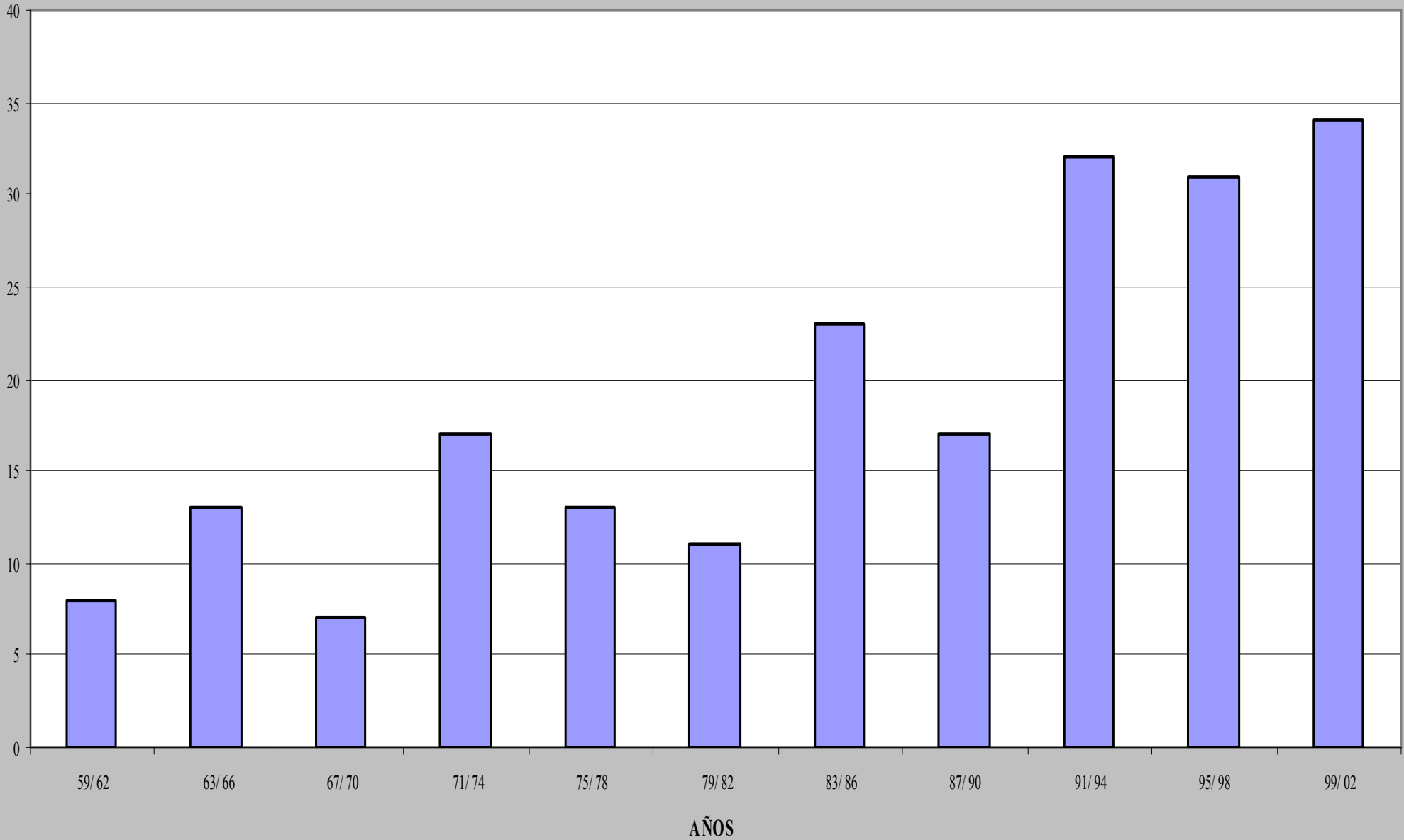
Glaciar Humo, Mendoza, 1914



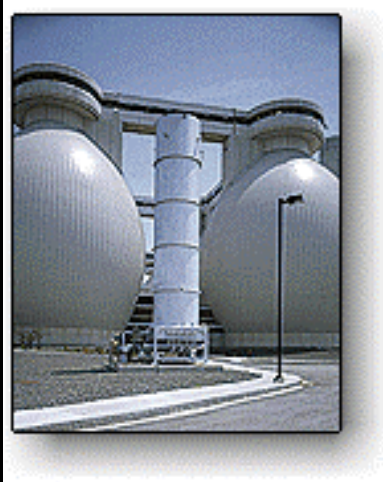
Glaciar Humo, Mendoza, 1982



Number of events with precipitation greater than 100 mm in no more than two days (16 stations of the Center and East of Argentina)

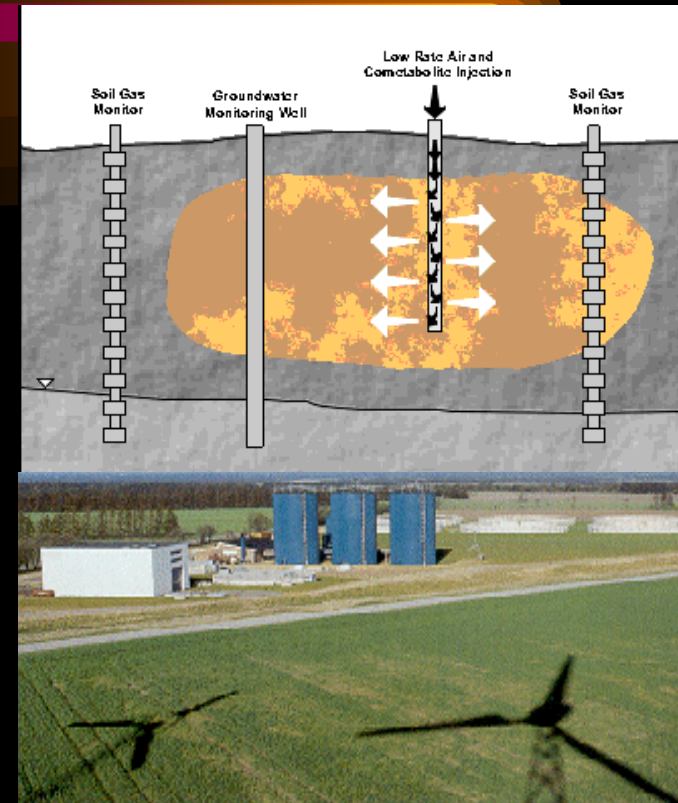


In this new scenario the role of anaerobic digestion is very important

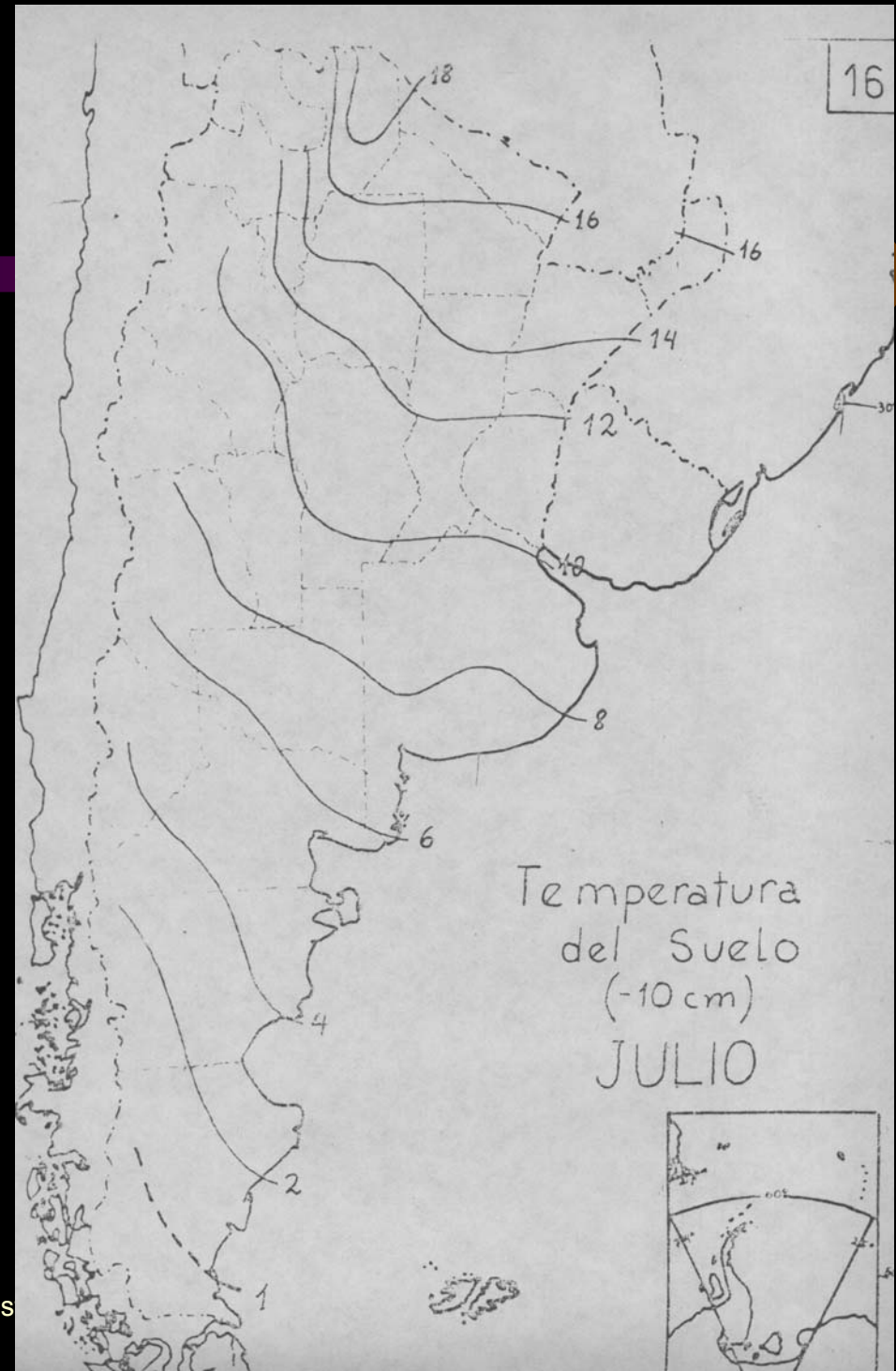


Fields

- Garbage treatment.
- Agro industries
- Small rural digesters
- Intensive productive farms
- Sewage water treatments



Soil temperature in winter



Potential of the agricultural sector

According to present confined animal production there is a potential capacity of capturing and using 120 million m³ of methane per year

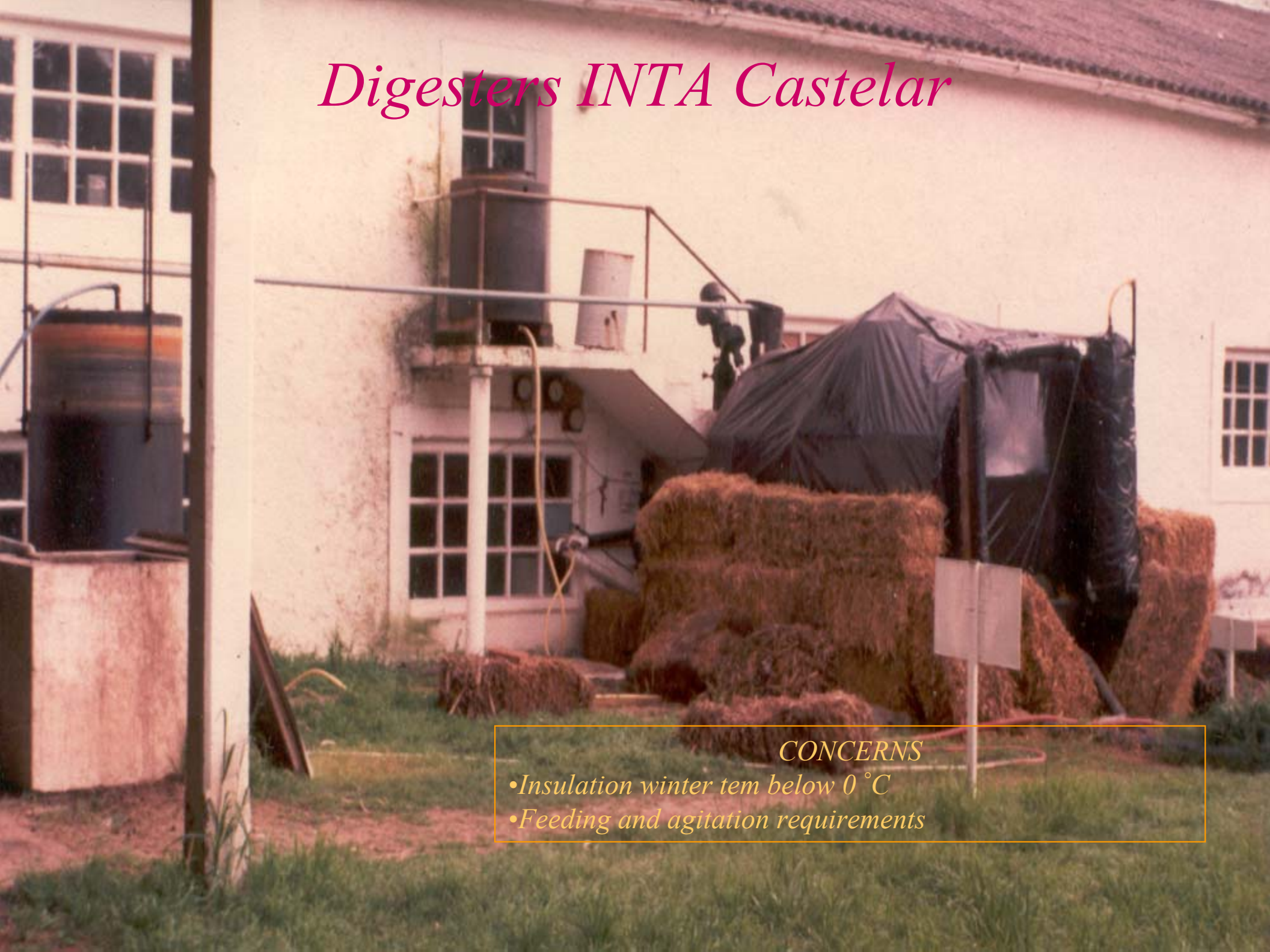
Research Digesters INTA Castelar

•Hindu type digester

Batch batteries 200 l
digesters

- 6 cubic meter capacity
- 10 years in operation
- Fedded with pig, cattle, horse and chicken manure
- Mean production 6 to 11 m³/day
- Temperature 36 to 40 °C
- Heating requirements 25 to 30 % of dairy production

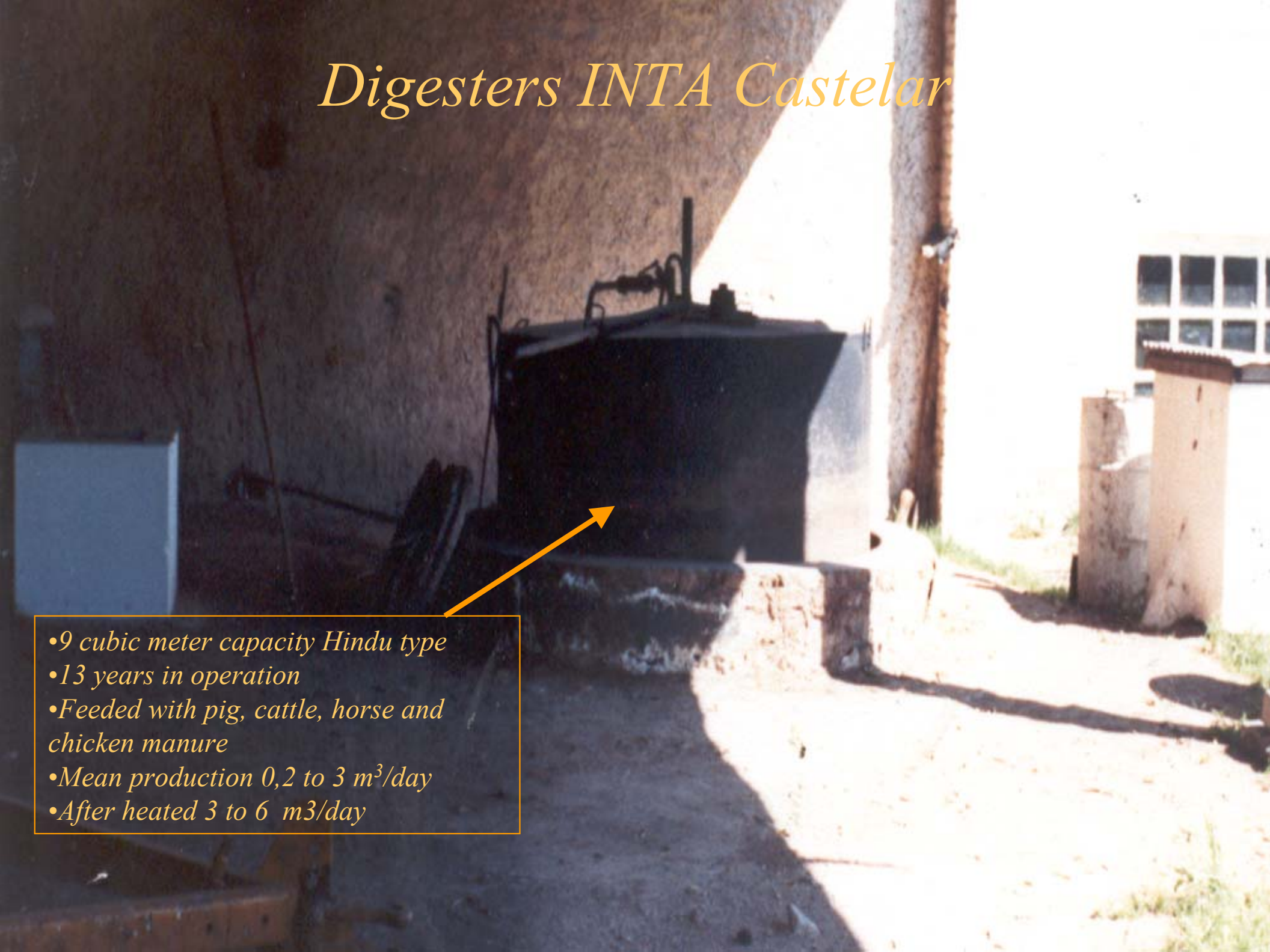
Digesters INTA Castelar



CONCERNS

- Insulation winter tem below 0 °C*
- Feeding and agitation requirements*

Digesters INTA Castelar

- 
- *9 cubic meter capacity Hindu type*
 - *13 years in operation*
 - *Feeded with pig, cattle, horse and chicken manure*
 - *Mean production 0,2 to 3 m³/day*
 - *After heated 3 to 6 m³/day*

Batch digester INTA

- *Three chamber batch type digester*
- *High solid contents*
- *No insulation or heating*
- *Summer tem 14 – 17 winter 10 – 12 °C*
- *Mean production w 0,4 sum 2 m³/day*
- *Operational problems*





INTA

BIOGAS

DIGESTOR

DISCONTINUED

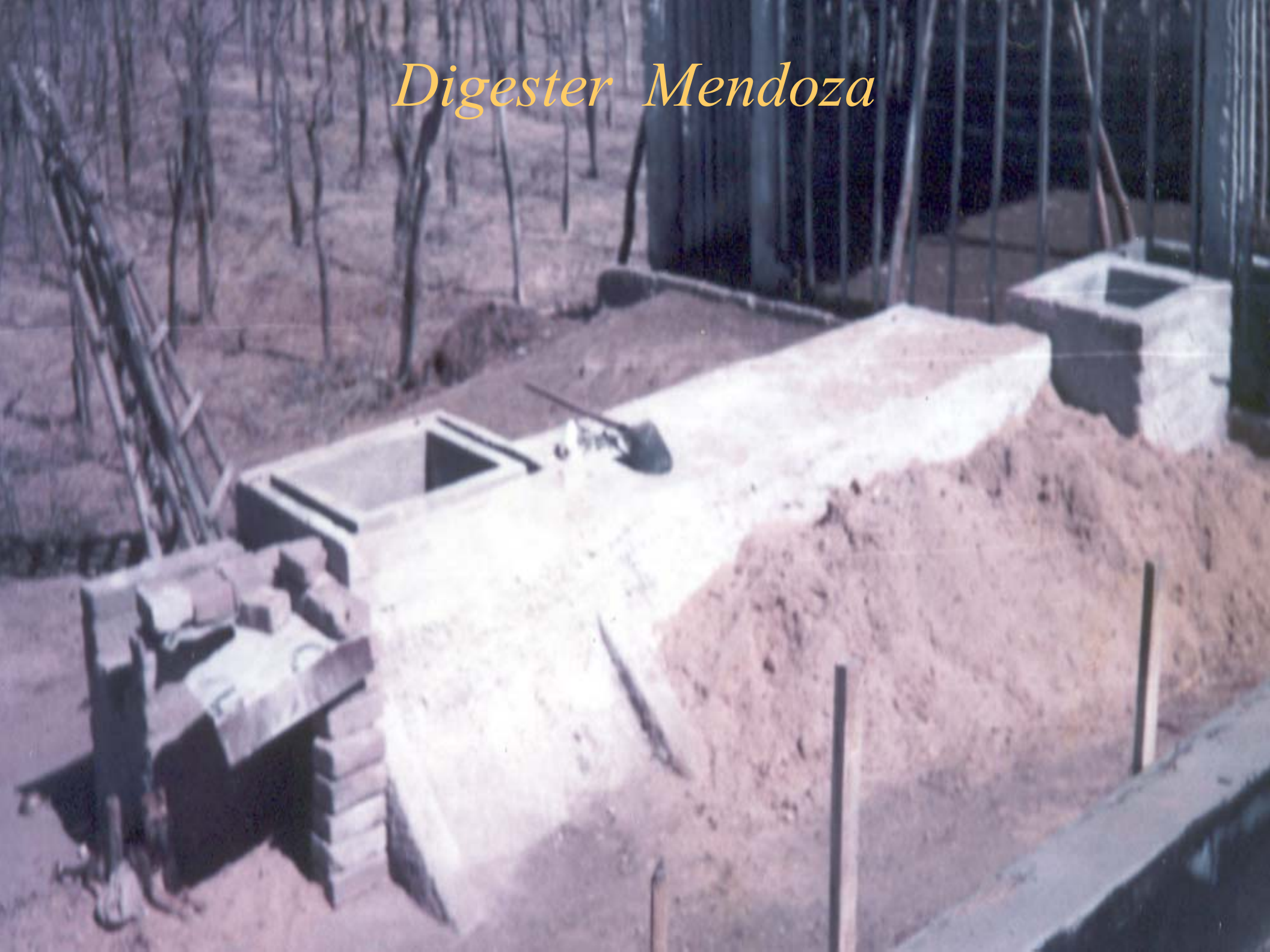
Dairy farm plant Suipacha Bs.As.

Dairy farm Suipacha Bs.As.

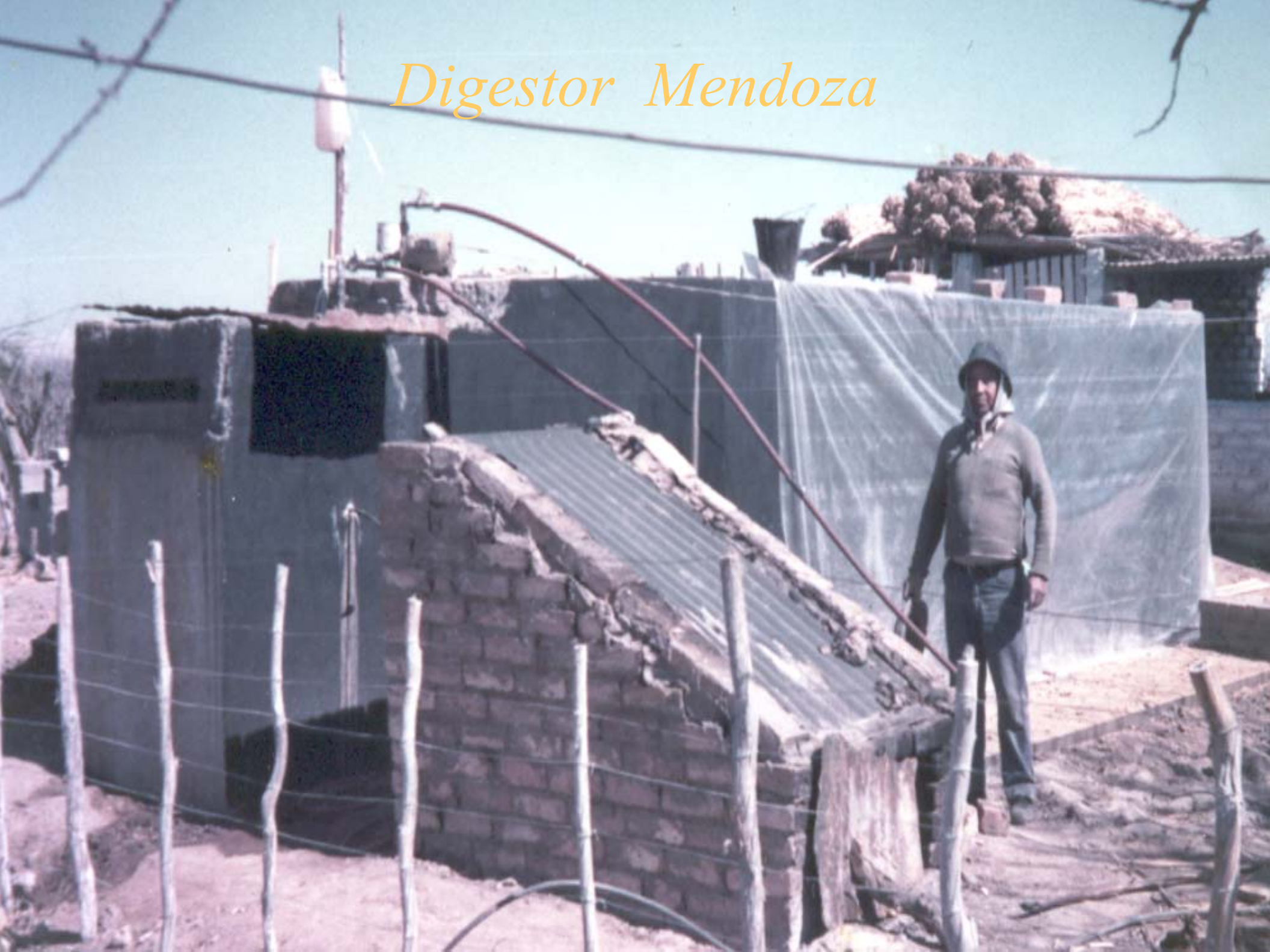
- Two chambers cont digester 113 m³*
- Low solid 2,1 %and temperature feed*
- Dairy farm with 70 cows*
- Heated mean temp 17 °C*
- Mean production w 11 sum 16 m³/day*



Digester Mendoza



Digestor Mendoza



Dairy farm Lujan University digester



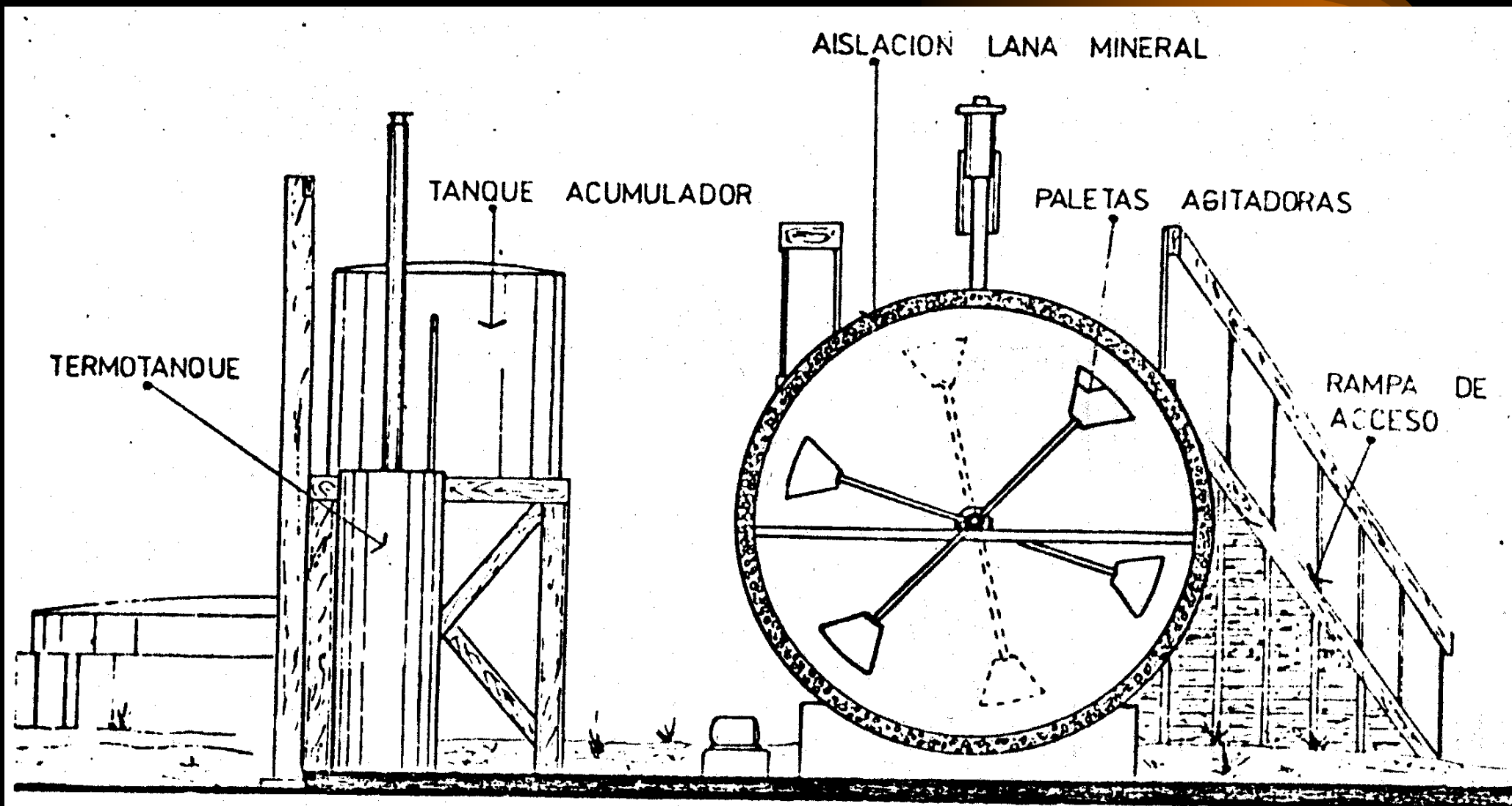
FAO network digester agricultural school Chile



- Agricultural School Chile FAO network*
- *Cont digester 24 m³*
 - *Good insulation*
 - *Dairy farm and pigs*
 - *Heated by biogas internal exchanger*
 - *Mean production 16 m³/day*

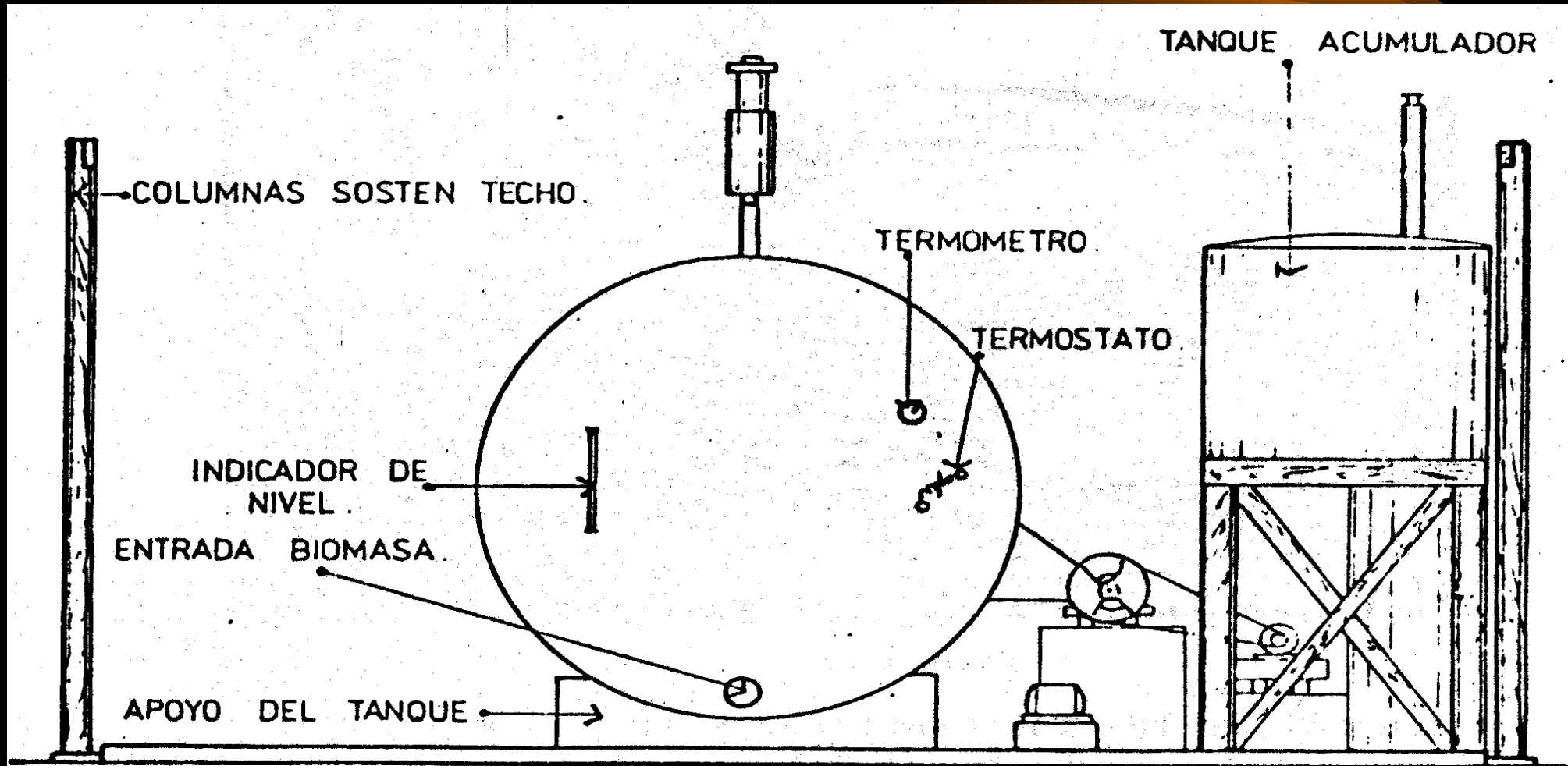


FAO network digester agricultural school Chile



FAO network digester agricultural school Chile

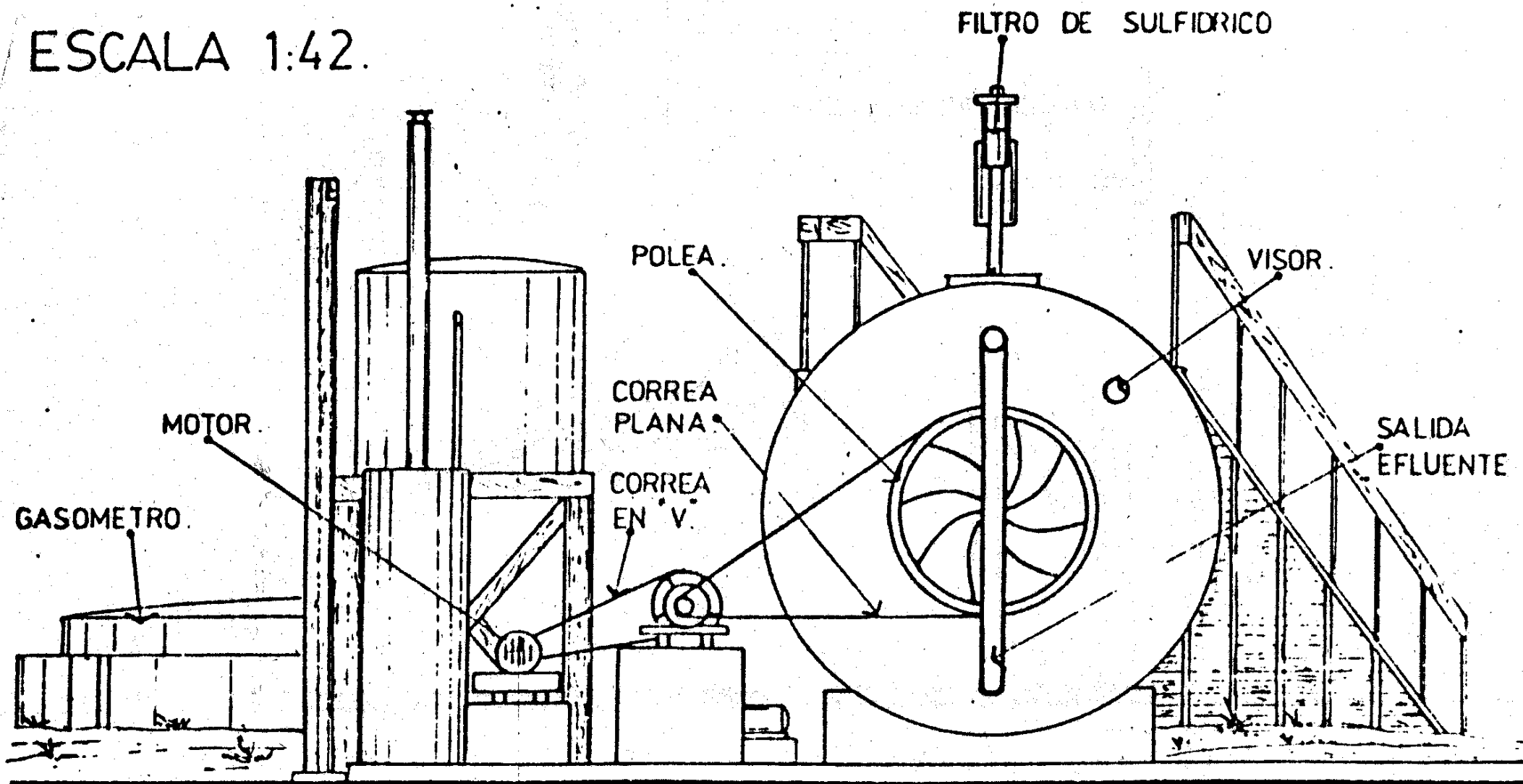
Chile



VISTA

FAO network digester agricultural school Chile

ESCALA 1:42.



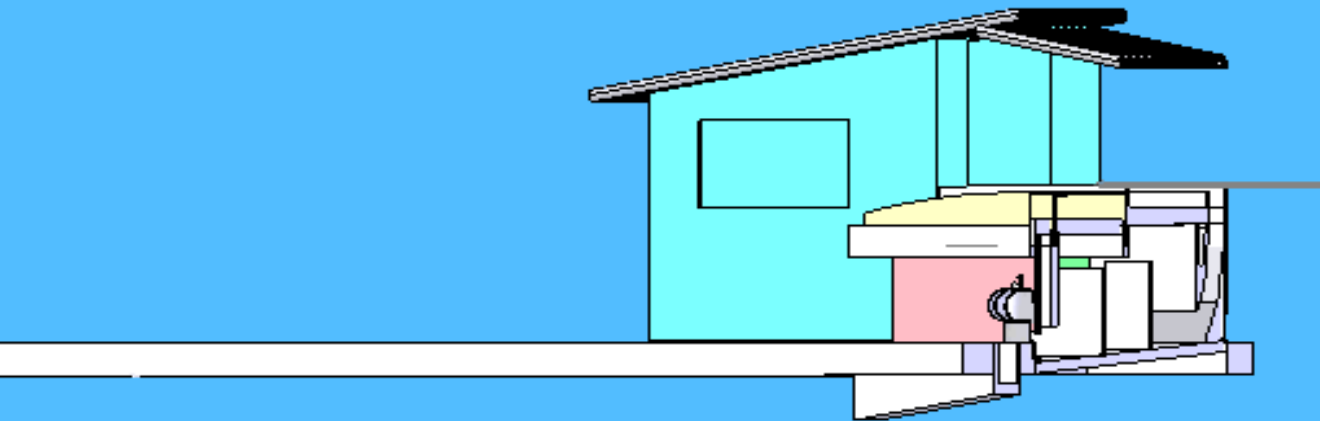


New plant under construction INTA.

- *One chambers cont digester 12 m³*
- *Three internal chambers*
- *Electronic heating control*
- *High solid urban feed*







PRACTICAL PROBLEMS

- Insulation
- Energy balance during hard winters
- Time available for the operation
- Need to agree what to do with effluents
- Low electrical costs
- Great distances

Present situation on dairy pigs and other intensive animal production sites



*Great deposits with no control over
emit ions and other environmental
soil and water concerns*

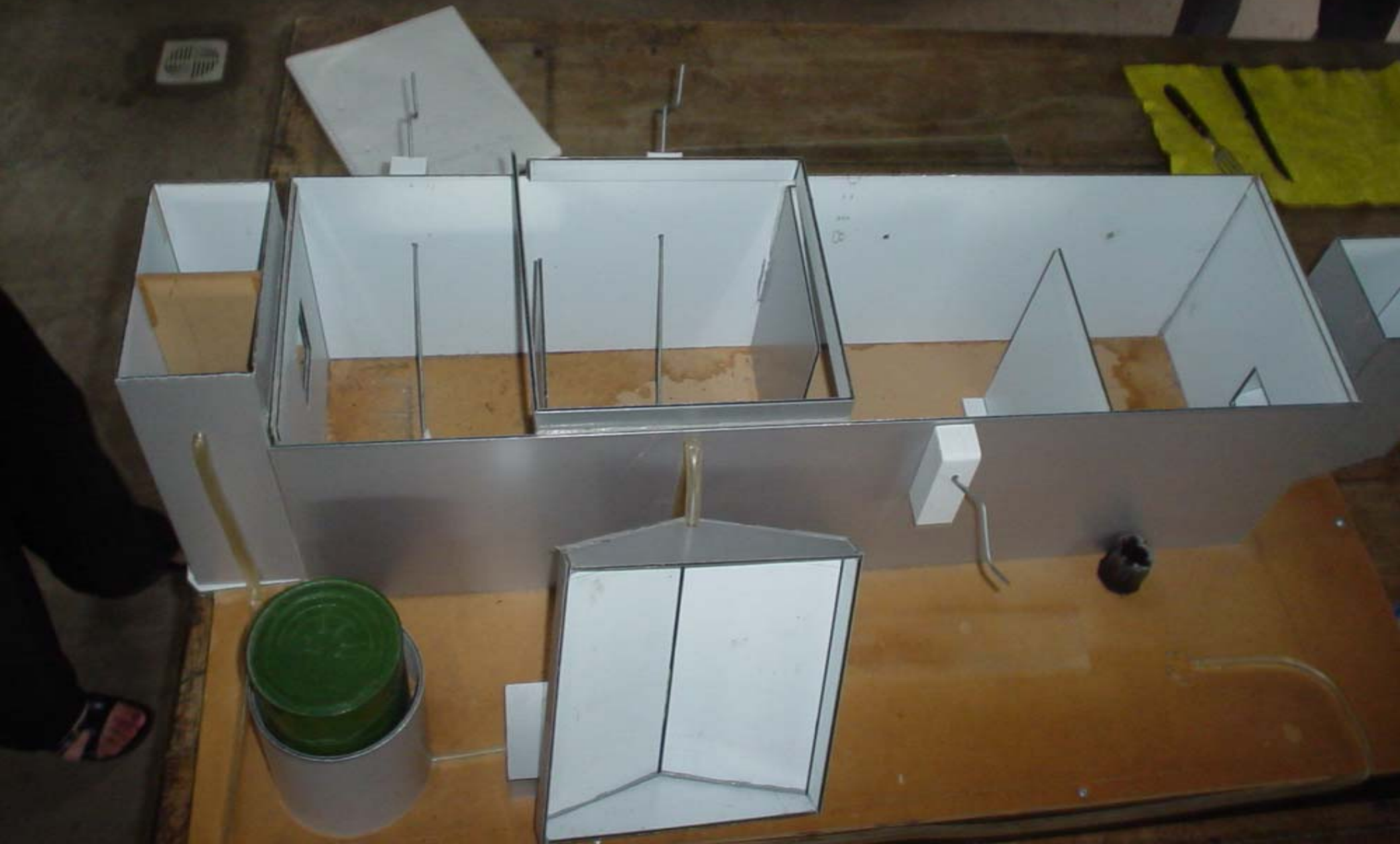


Present situations

- Methane emissions
- Underwater and river pollution
- Contaminations due to flies, rats and other pests



Rural community treatment plant S.Fe Argentina 2003



Rural small town Emilia Santa Fe

- Digester working on domestic organic waste.
- Horizontal plug flow design
- 700 a 800 kg per week mixed with 50 % of water.
- Feed chamber volume 1600 liters.
- Sólids 20 %.





Agro industrial sector

- Digester full mixed plant 1200 m³
- Production 140 m³/hour.
- Feed 140 m³/hour
- DQO 4000 ppm.
- Efficiency 1,2 m³ per m³ of sewage
- 15 % of energy needs





TOMA DE MUESTRA
MODULO A

CICSA
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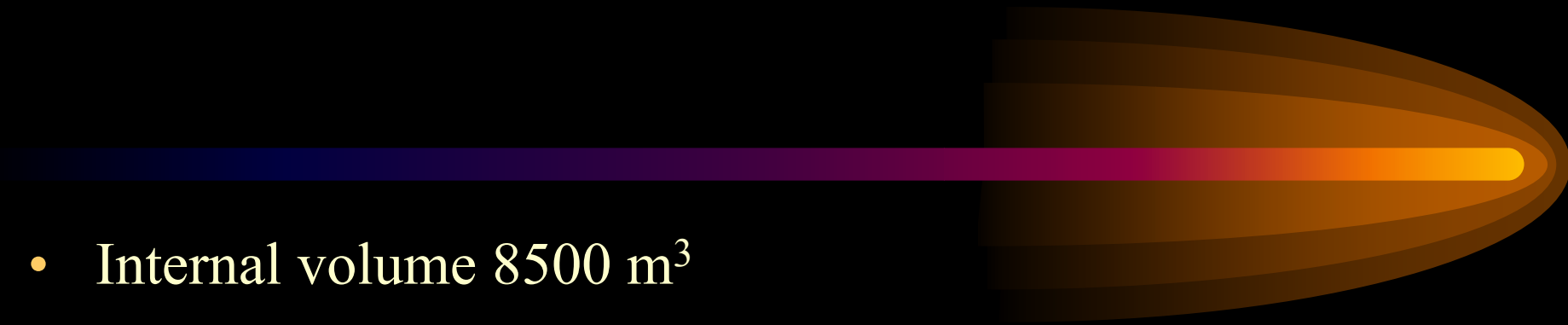
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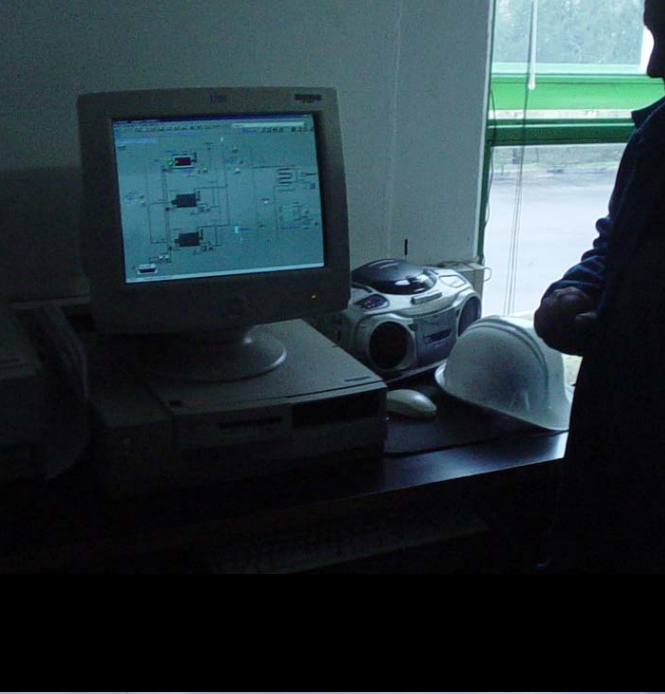


Great scale anaerobic digestion

- 
- Internal volume 8500 m³
 - Feed 200 m³/day DBO 210 mg/l
 - Gasometer 1100 m³
 - Dairy biogas production 60 – 90 m³
 - Heated and gas agitation







Definitions needed

- Type of user
 - Small rural scale
 - Agro industry
 - Urban
- Principal aim
 - Energy
 - Environmental control
 - Others



Impacts of the technology



- Emission control
- Soil improvement
- Erosion control
- New energy resources available
- Life conditions
- Human and animal health

Good results on anaerobic digestion adoption need

- A general environmental and energy policy that must take care of the long term sustainability in rural industrial and urban

ANSWER THE QUESTION

In which degree does this technology fulfill the actual requirements of the different sector

involved?

Research and development strategy

Limit priority areas where this technology presents the greatest advantages



DEMONSTRATIVE PLANTS WERE LOCAL AND REGIONAL STUDIES CAN BE DEVELOPED IN ORDER TO SERVE AS EXTENSION FOCAL POINTS

Research and international cooperation needs on anaerobic technology

- **COST REDUCTION**
- **INCREASE IN EFFICIENCY**
- **INCREASE IN SYSTEM TRUST**
- Lower digester volumes
- Increase in treatment degradation speed
- Construction and insulation materials
- Microbiology.
- Process knowledge

THANK YOU

ADDITIONAL INFORMATION

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