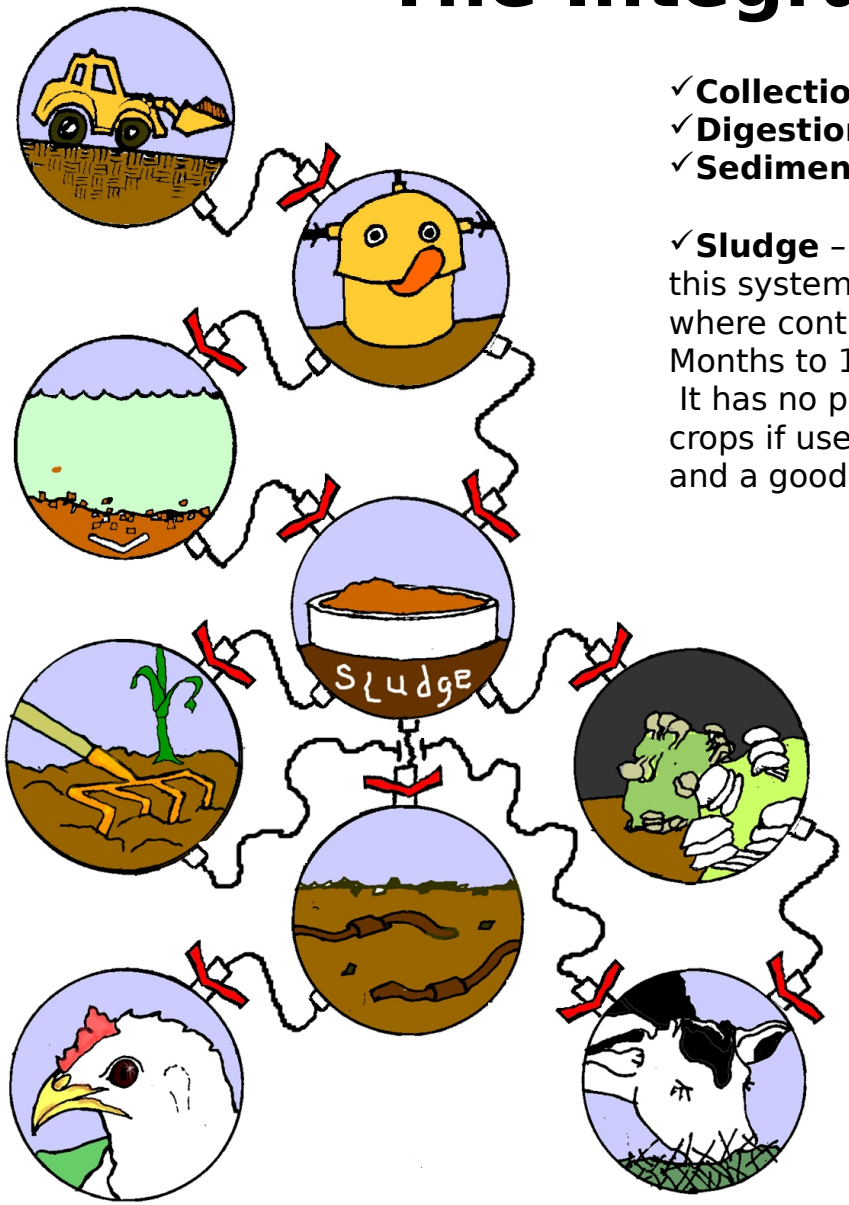
The Integrated Biomass System



✓**Collection** – gathering all materials
✓**Digestion**
✓**Sedimentation**

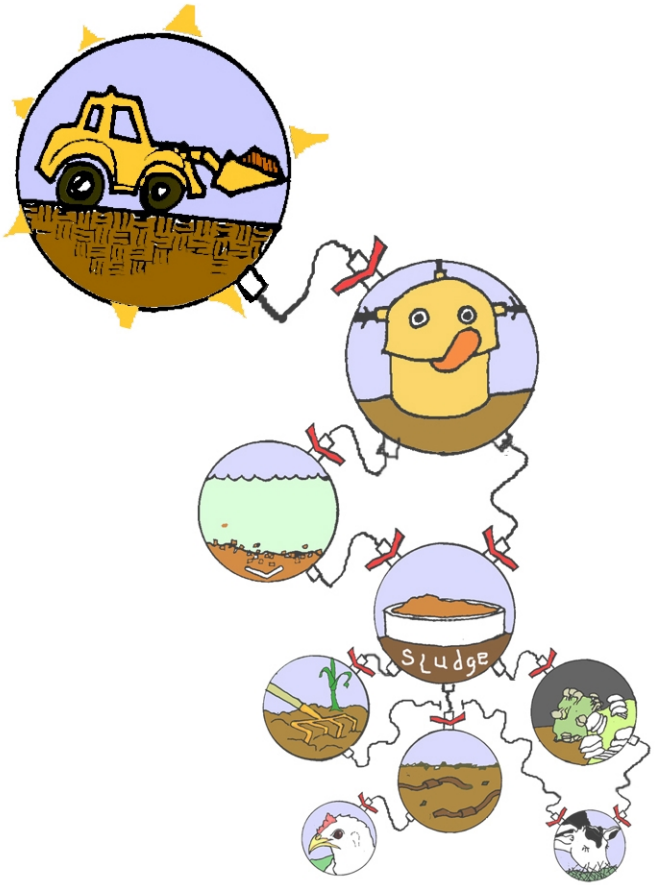
✓**Sludge** – a very important key to unlocking the productivity of this system. Sludge has been retained in an anoxic environment where continued anaerobic digestion has been occurring for 6 Months to 1 year (typical average retention time of the material). It has no pathogenic content, stable nutrients that will not 'burn' crops if used directly as a soil amendment or fungus substrate, and a good environment for the cultivation of earthworms.

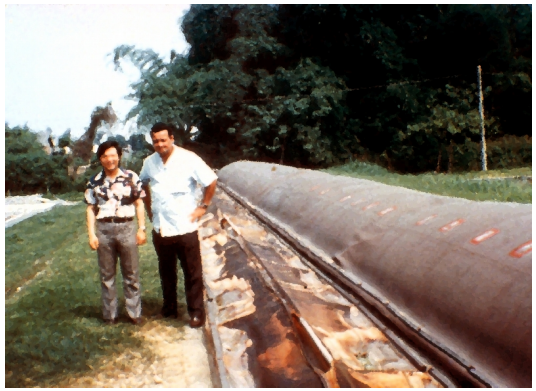
✓ **Sludge By-Products** –

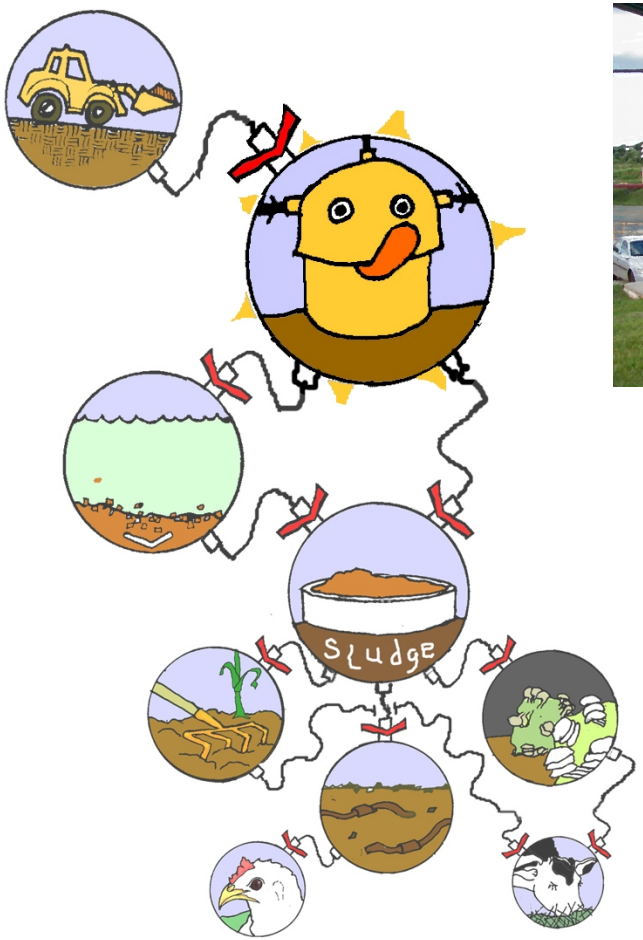
1. nutrient balanced and stable soil amendment (decreasing the need for fertilizers),
2. an ideal substrate for mushroom culture (which can be used as a feed amendment),
3. a perfect environment for the cultivation of earthworms (used as high protein feed supplement).

✓ **Consumer / Producers** – in any waste system, animal waster (including night soil) play an important role creating ecological, economical, and productivity feedback loops.

What difficulties would you imagine having at this phase of the project?







The following are plan drawings of various digesters.

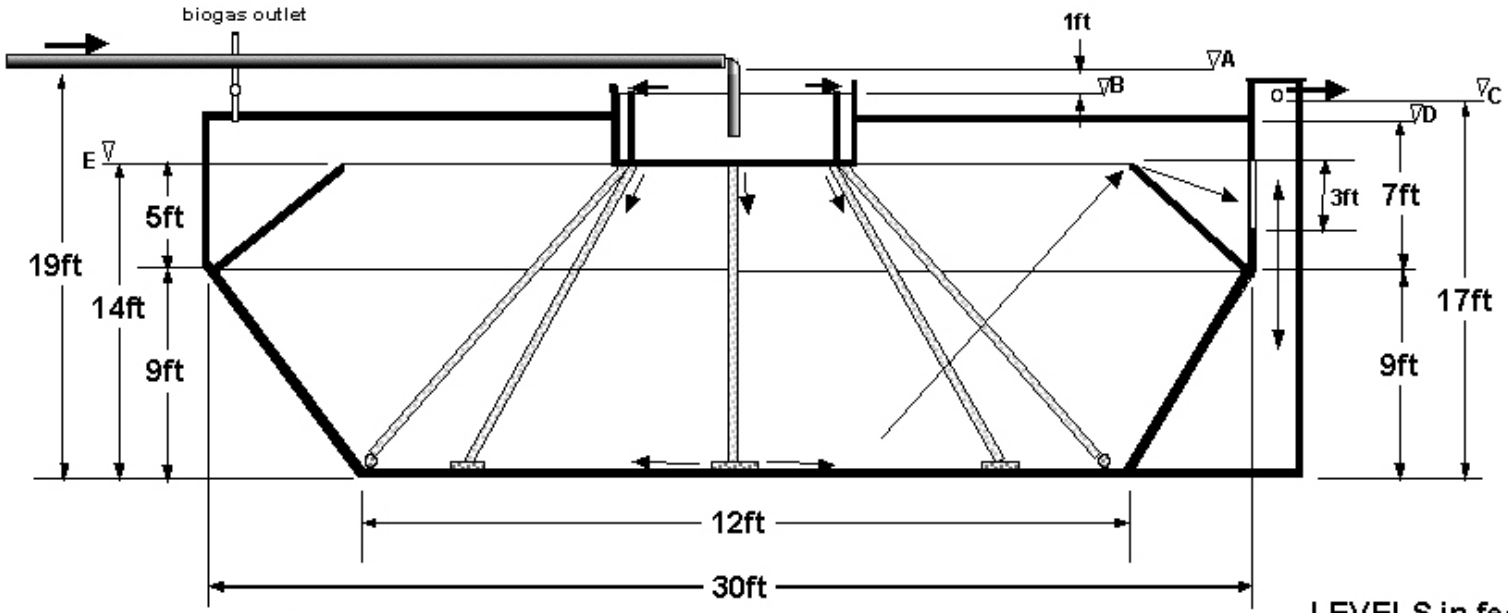
PicurisSL1aD
cianbio7-2

DESIGN of 240m3 or 60,000 gallon CAPACITY

ANAEROBIC REACTOR -- Reinforced Concrete

Fig. 1D

NTS



UASB DIGESTER DESIGNED FOR SEWAGE/ MANURE : HRT : 3 days minimum but SRT = 30-40 days

The daily sewage flow has been measured at 20,000 gallons for a population of 300 in Picuris Pueblo, which gives the staggering figure of 666 gallons per capita, compared with the normal 250 gallons per capita for USA and 65 gallons for European Union. This UASB Digester can be built in reinforced concrete, which will be quite costly. The alternative is to use discarded gasoline tanks of big capacity, which can be obtained at very low prices.

LEVELS in feet

A --	datum	0 (19ft)
B --	distributor	-1.0 (18ft)
C --	outlet	-2.0 (17ft)
D --	gas dome	-3.0 (16ft)
E --	overflow	-5.0 (14ft)

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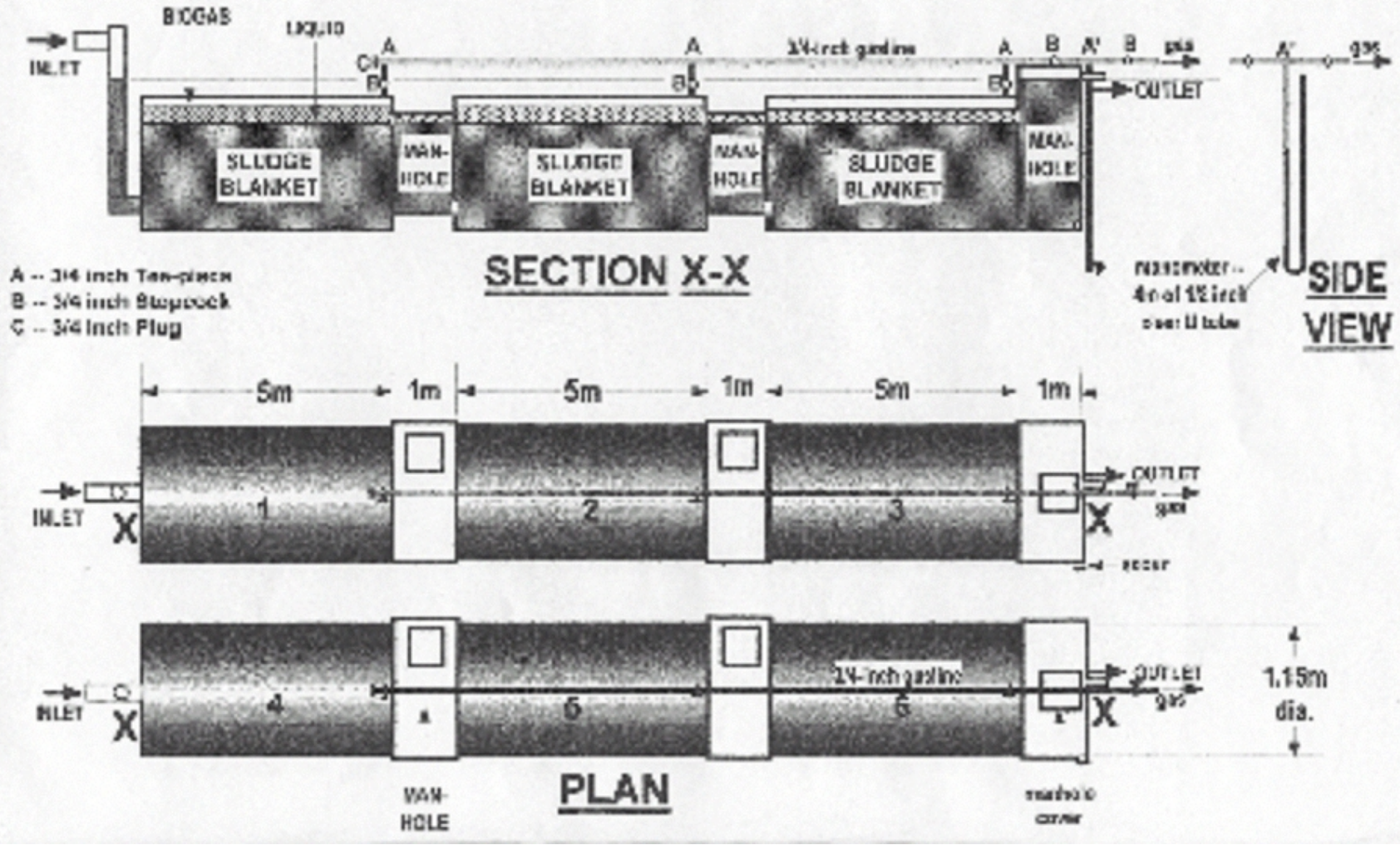
36 m³ STEEL DIGESTER UNITS

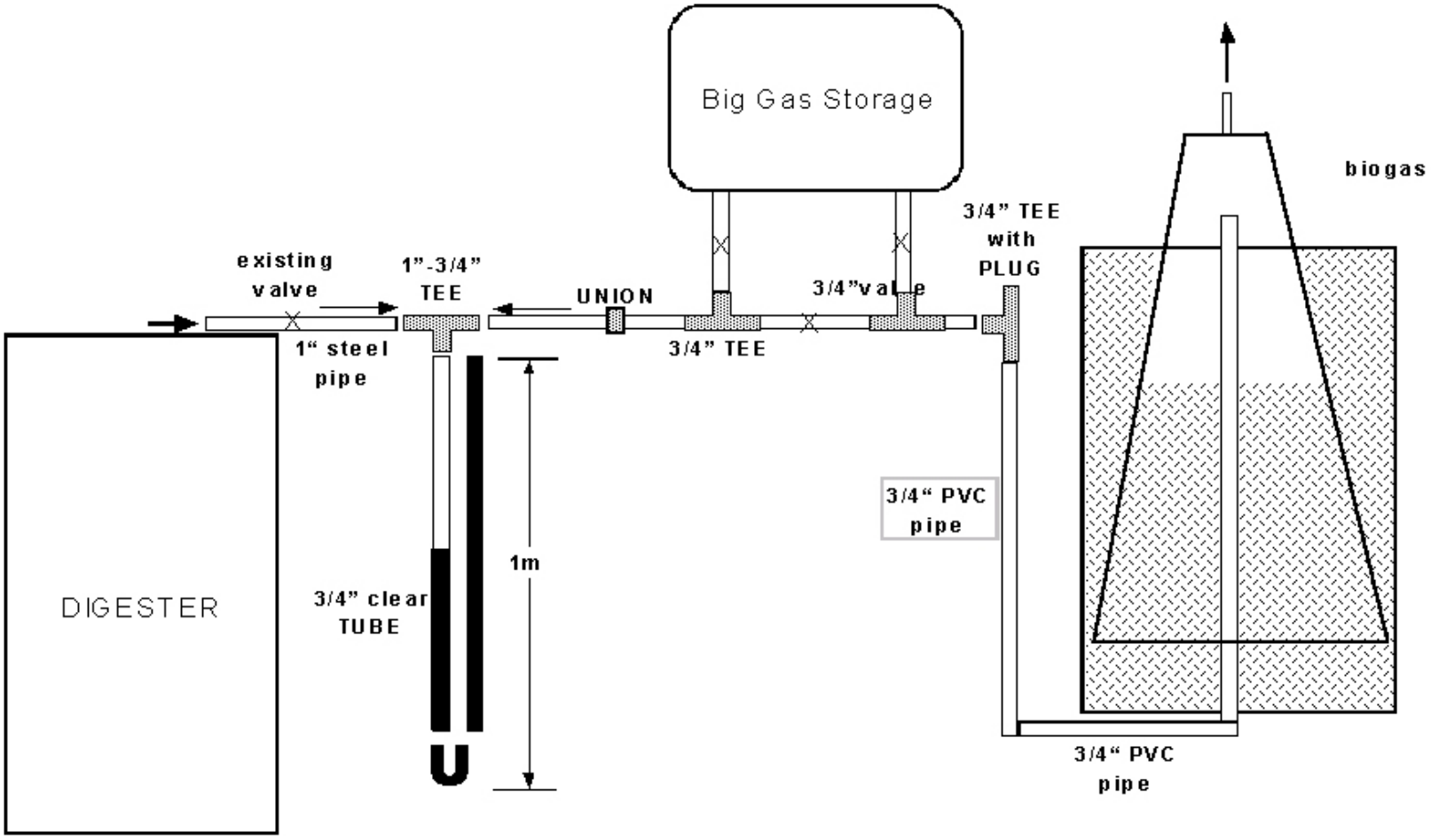
GAVILANES FARM, Pereira, Risaralda COLOMBIA



GG Lpig8
clarblo99

GAVILANES GASOMETER PIPING

Fig. 3
not to
scale



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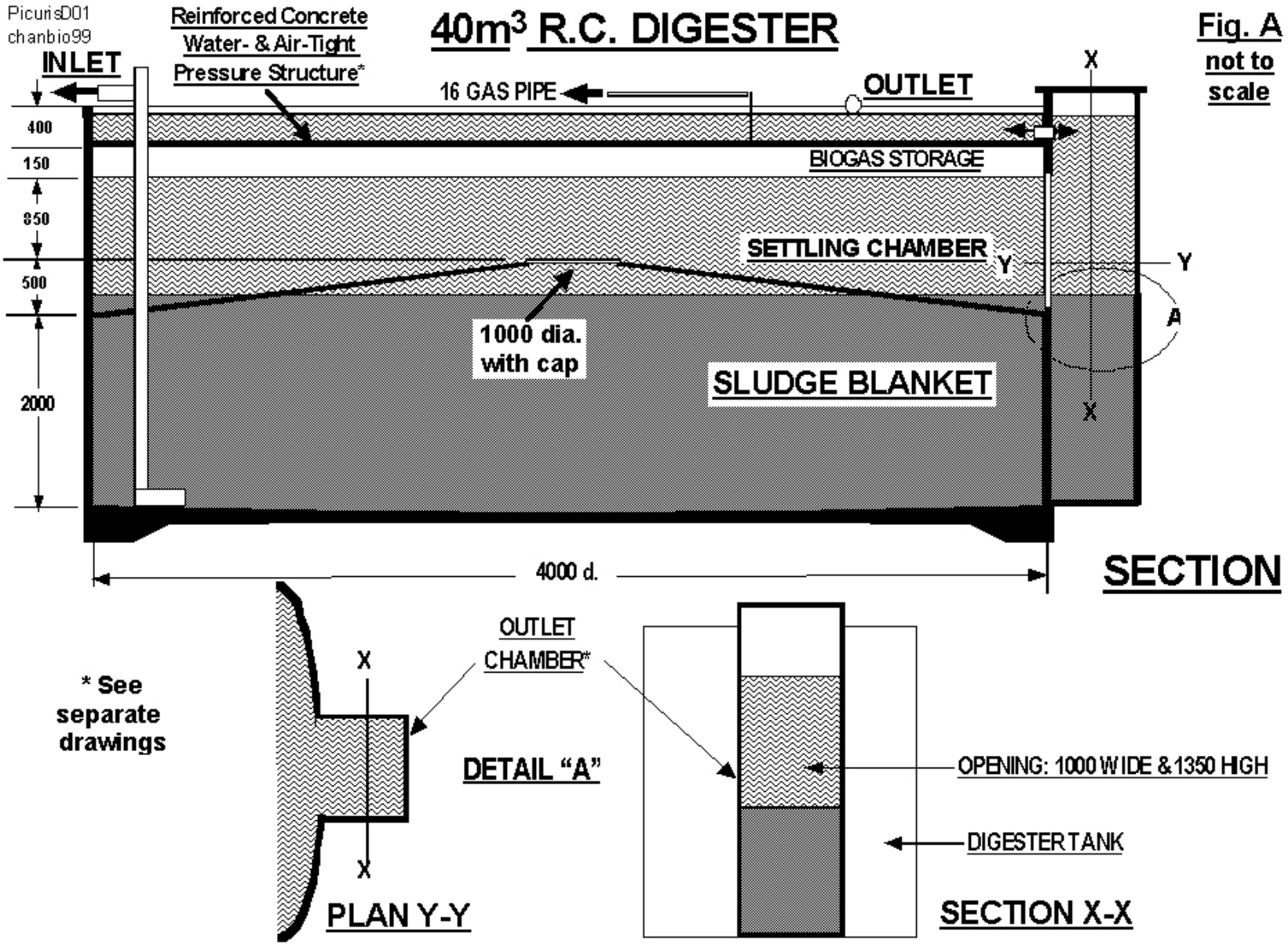
PicurisD01
chanbio99

40m³ R.C. DIGESTER

Fig. A
not to scale



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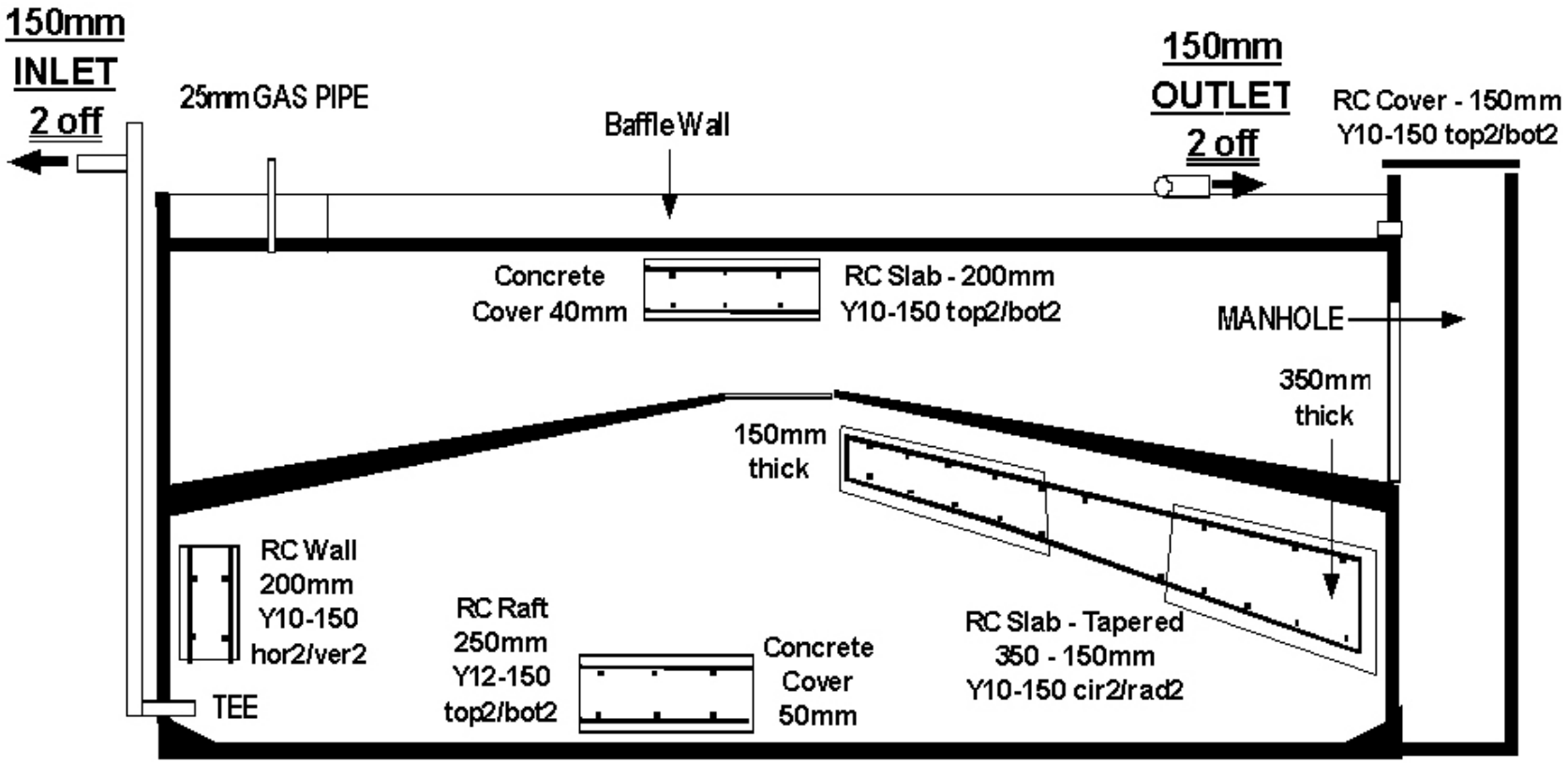
MausmD02
chanbio99

40m³ R.C. DIGESTER

REINFORCEMENT DETAILS

(Only main ones shown)



ALL JOINTS TO BE AIR-TIGHT

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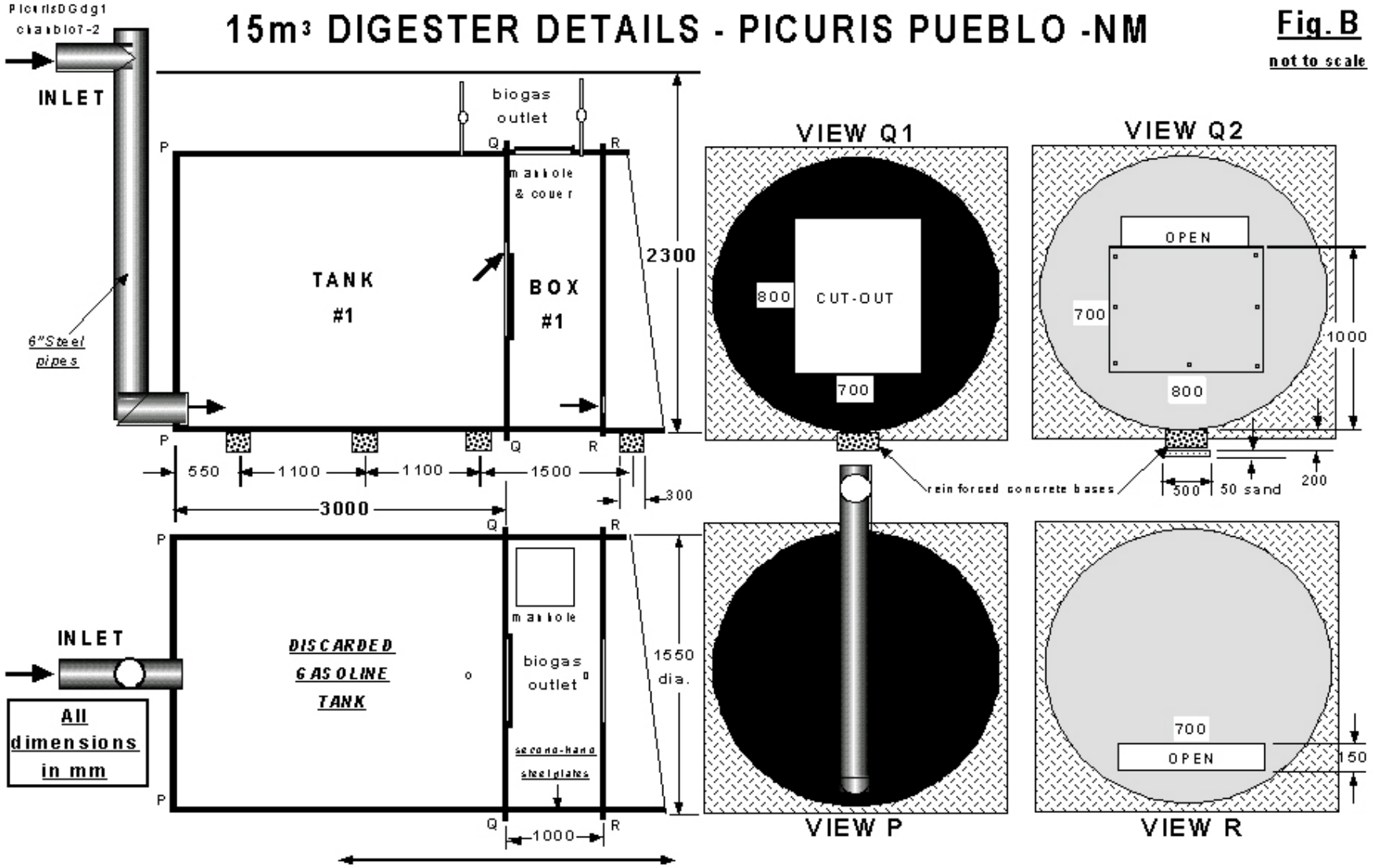
PicurisDGdg1
chanblo7-2

15m³ DIGESTER DETAILS - PICURIS PUEBLO -NM

Fig. B

not to scale



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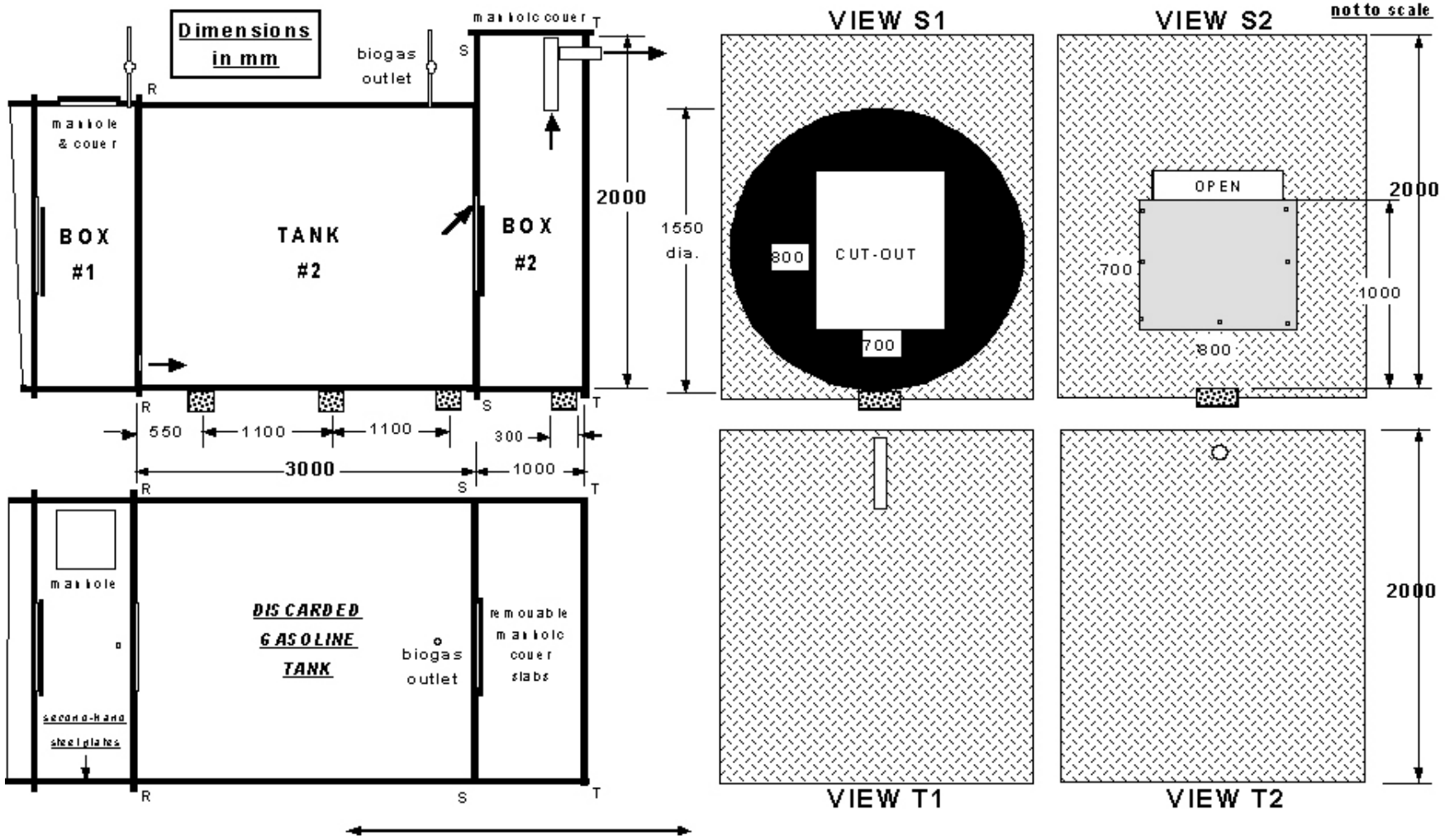
PicurisDG dg2
chanblo7-2

15m³ DIGESTER DETAILS II - PICURIS PUEBLO -NM

Fig. C

not to scale



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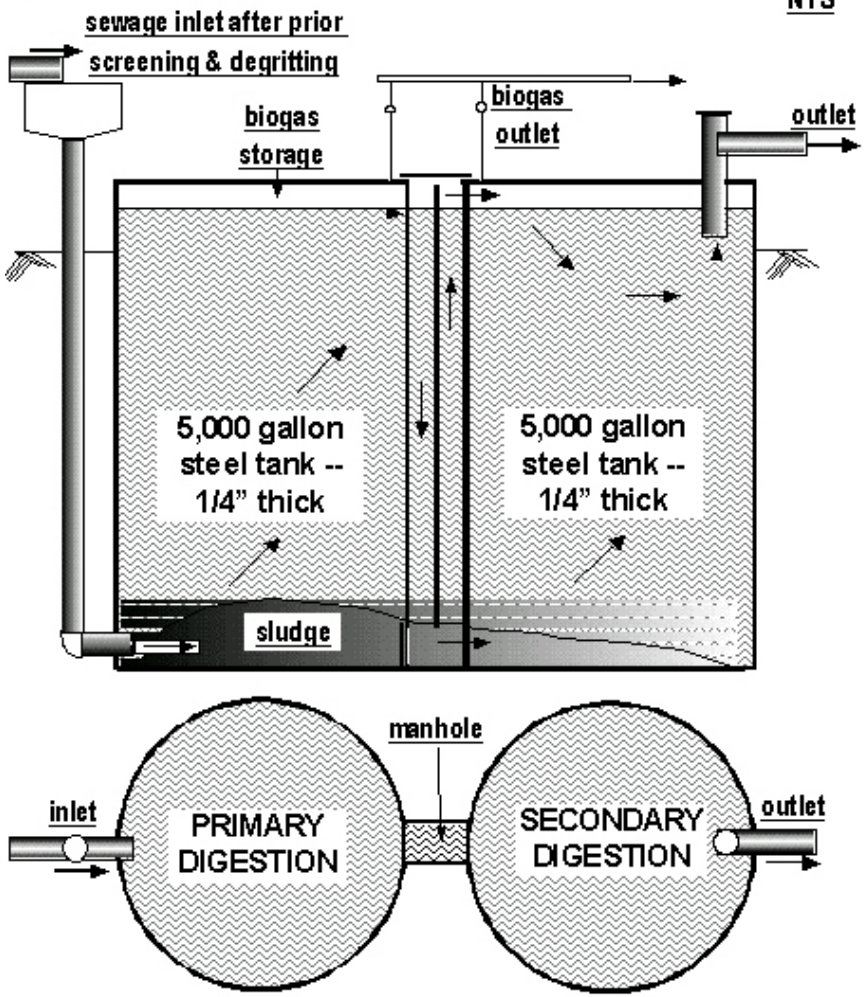
DESIGN of 40m3 or 10,000 gallon CAPACITY ANAEROBIC REACTOR -- New Steel Tanks for INTEGRATED SEWAGE MANAGEMENT

FlourisSL1aaD
chanbio7-2

Fig. 1aaD
NTS



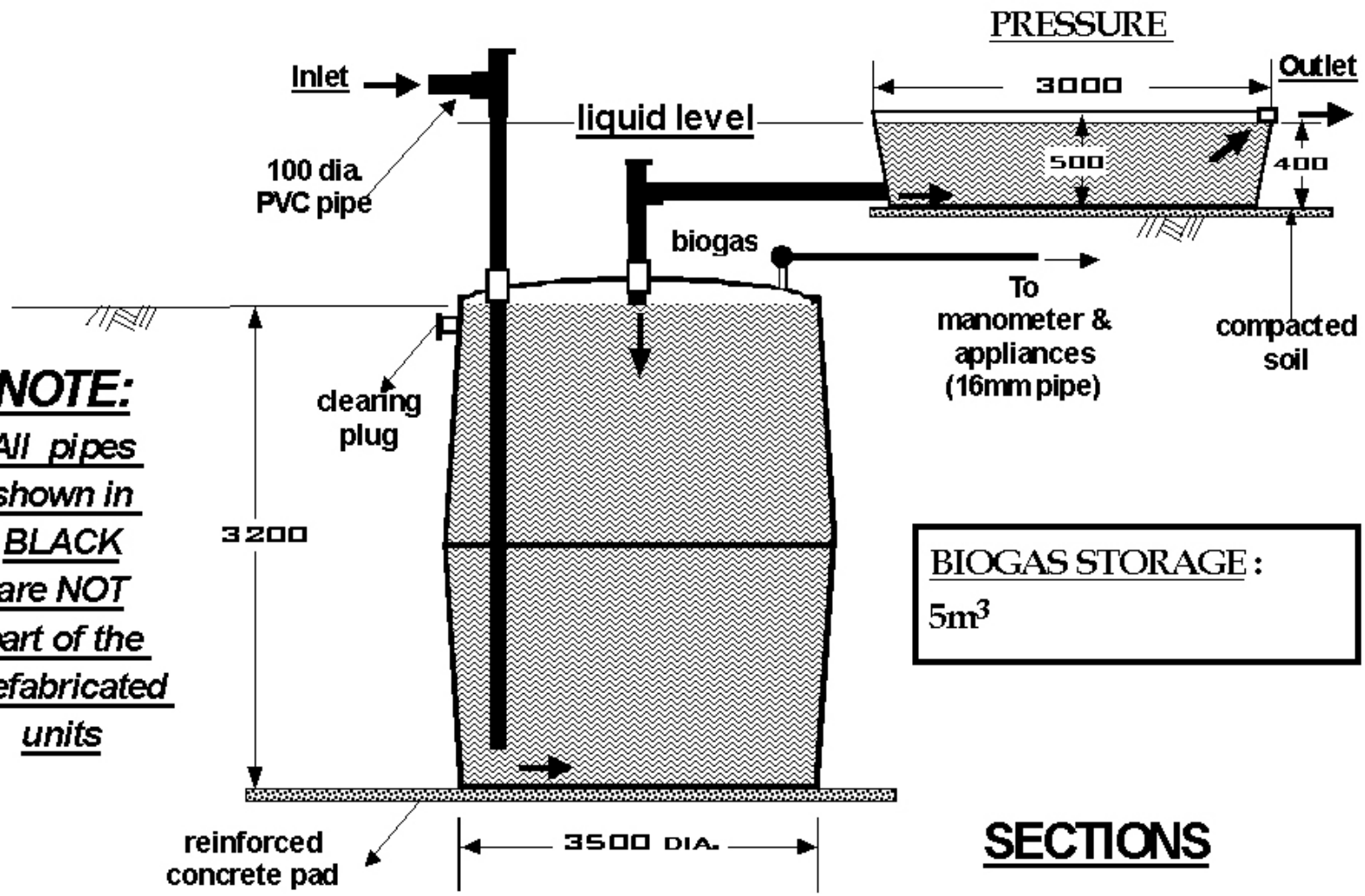
THE DESIGN IS FOR A DAILY FLOW OF 20,000 GALLONS, WITH 12 HOURS HYDRAULIC RETENTION TIME, SO THE CAPACITY OF THE DIGESTER IS 10,000 GALLONS, OR

mauSMfgU
chanbio97

30m3 FIBREGLASS DIGESTER

St Martin Pig Cooperative Society

Fig. M
not to
scale



NOTE:

All pipes shown in BLACK are NOT part of the prefabricated units

BIOGAS STORAGE :

$5m^3$

SECTIONS

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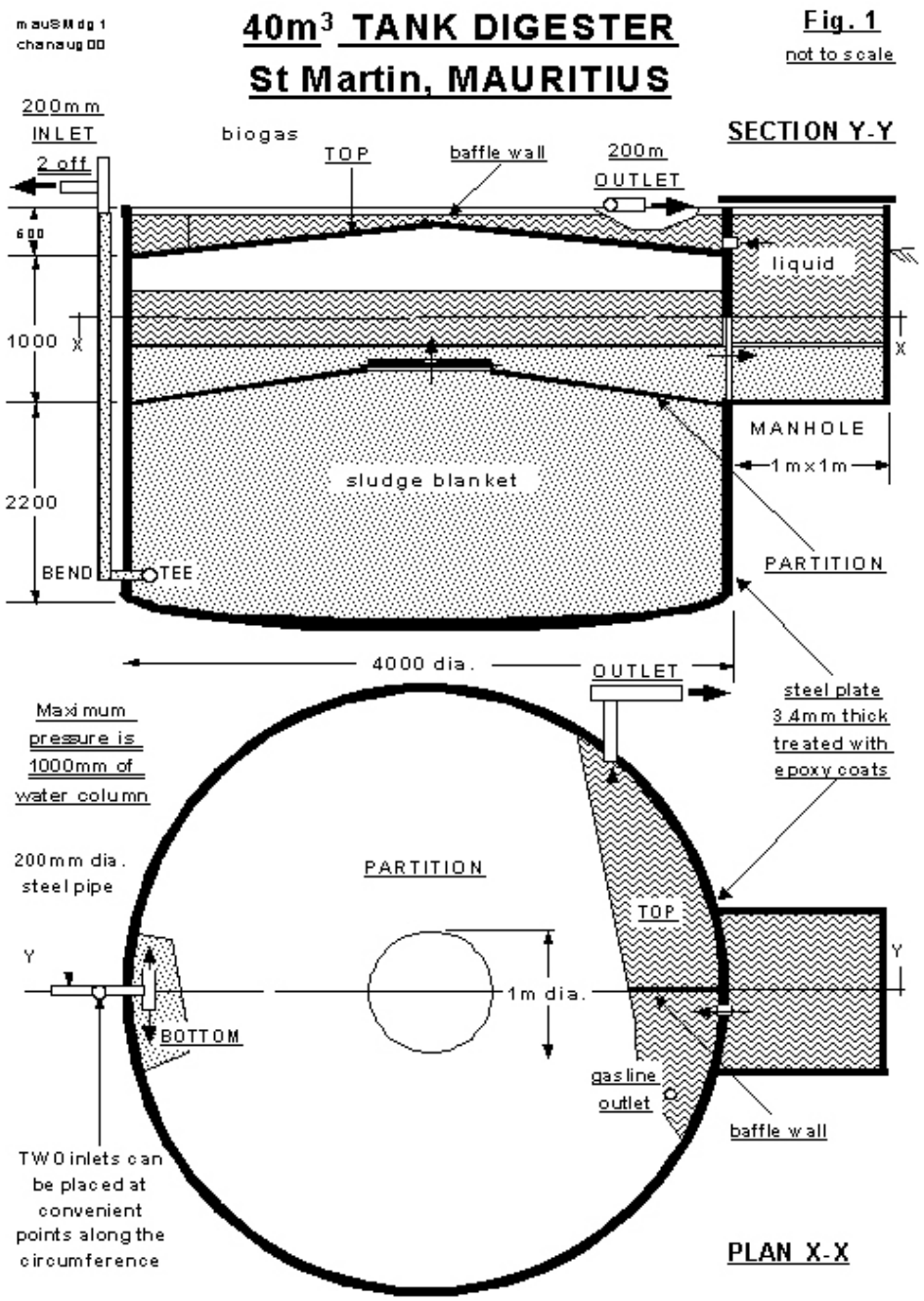
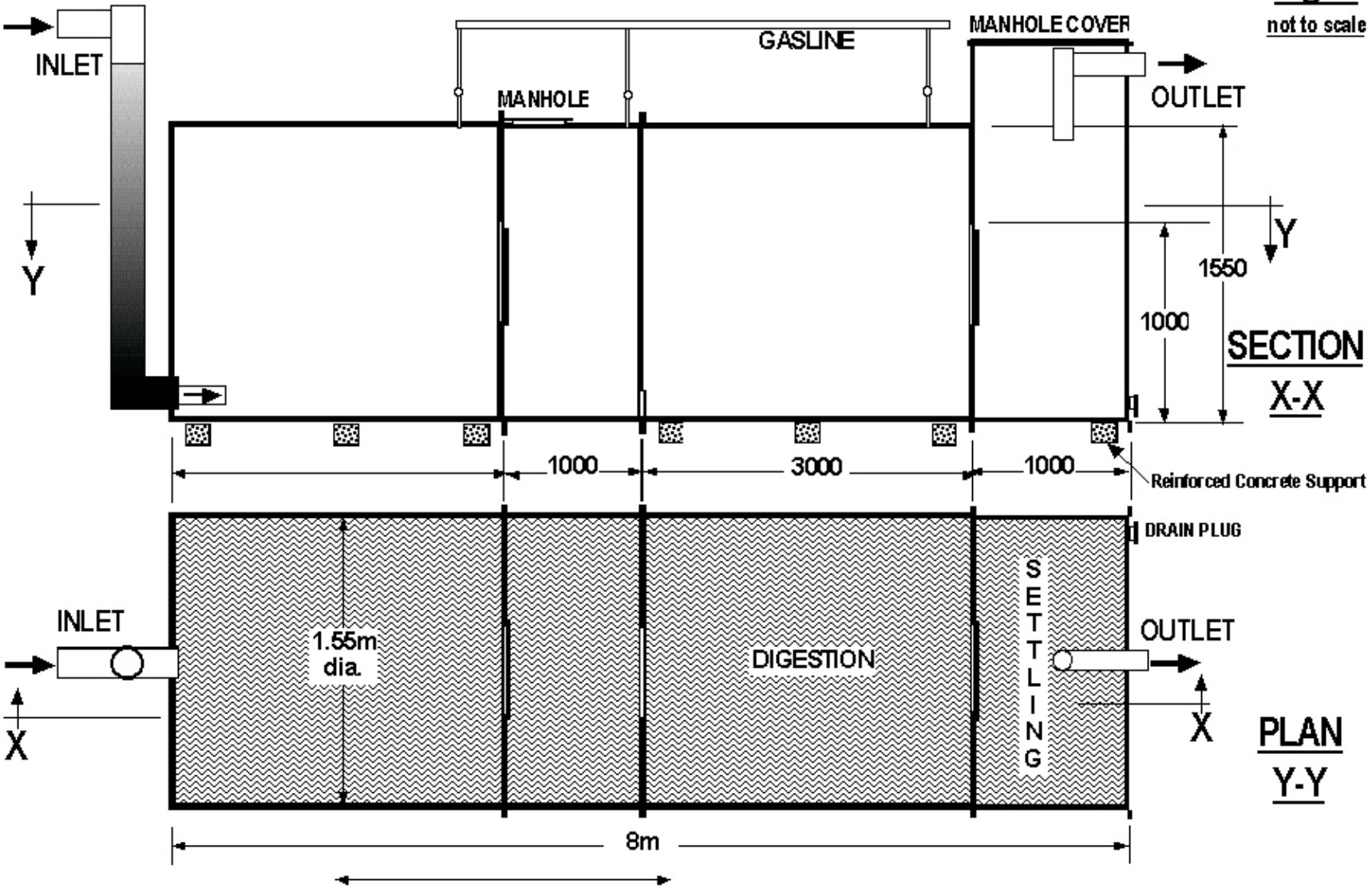


CRUZscA
chanbio99

15m³ DIGESTER TANKS & B0XES -- VERA CRUZ A

Fig. A
not to scale



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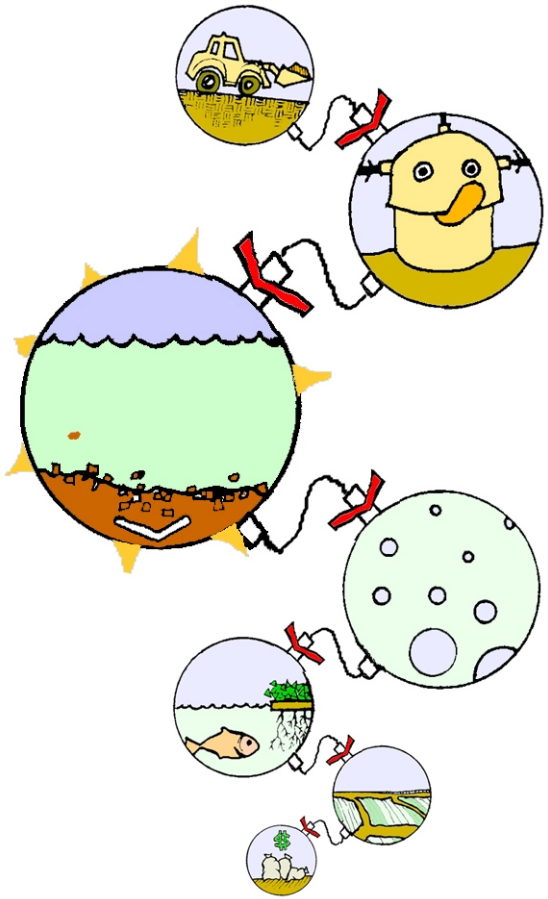


algae

plant

animal

bacteria

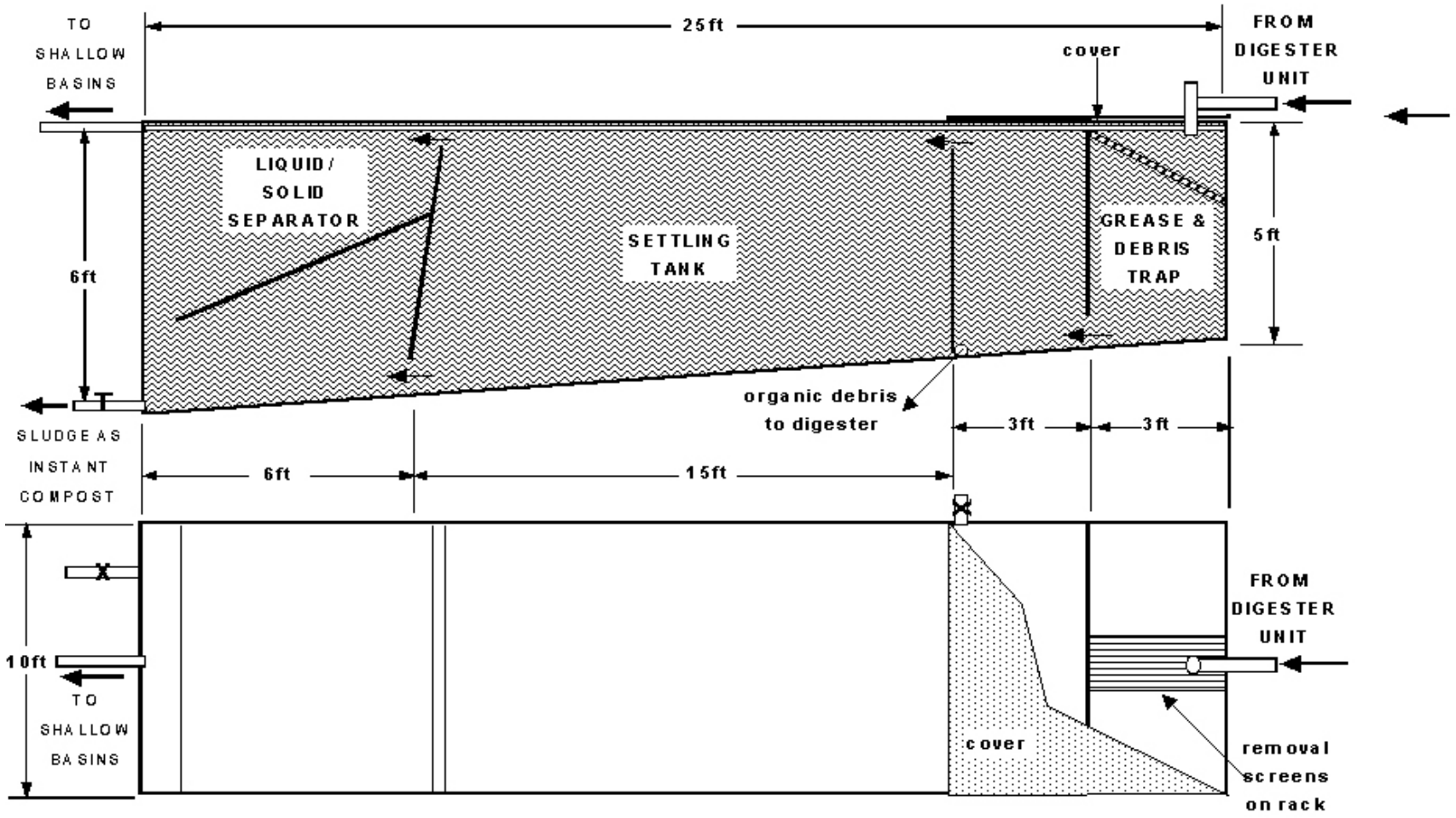
fungus

How much, and what kind of maintenance is involved with the sedimentation tank?

PicurisDF12b
chanbio7-2

PICURIS PUEBLO -- 30m^3 SETTLING TANK
Demonstration Farm -- (Can also be in earth)

Fig. 12b
not to scale



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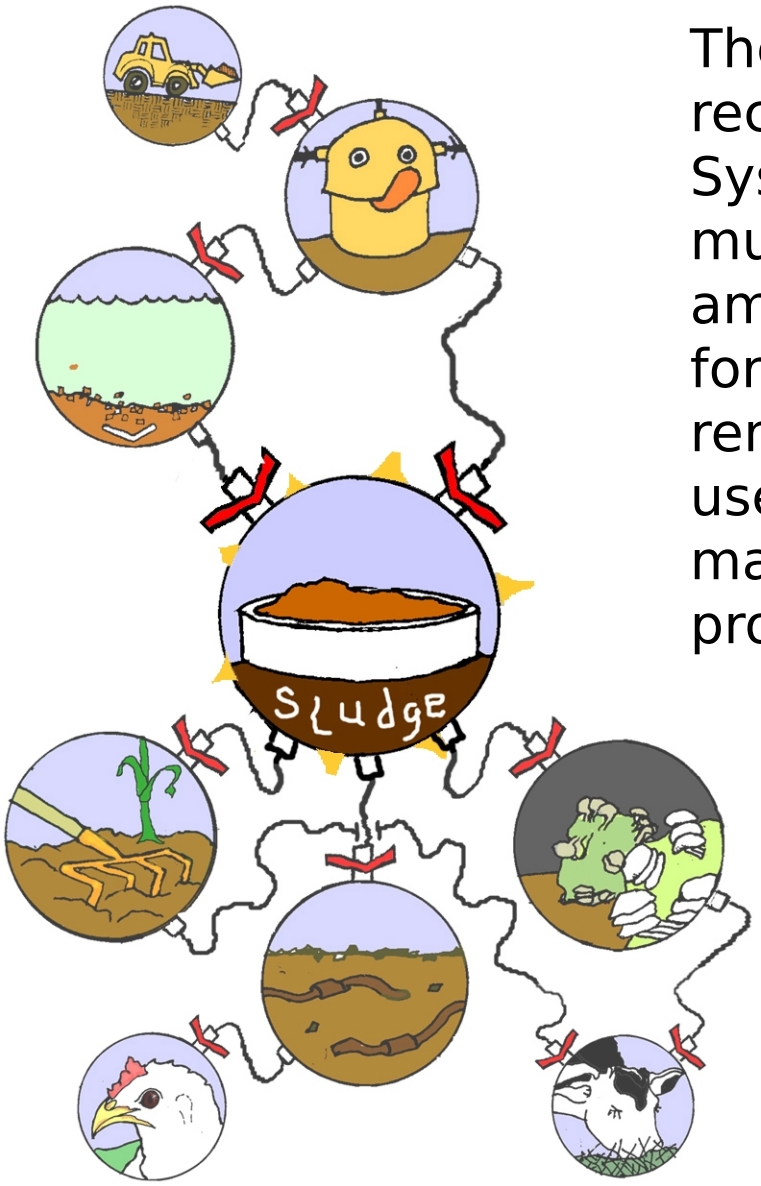
Sludge



The sedimentation and sludge is recycled in the Integrated Biomass System for use as a nutrient balanced mushroom substrate or soil amendment. These processes allow for the natural treatment of all remaining 'wastes' while producing useful Biomass for sale or use as input materials for other manufacturing processes.

algae

plant

animal

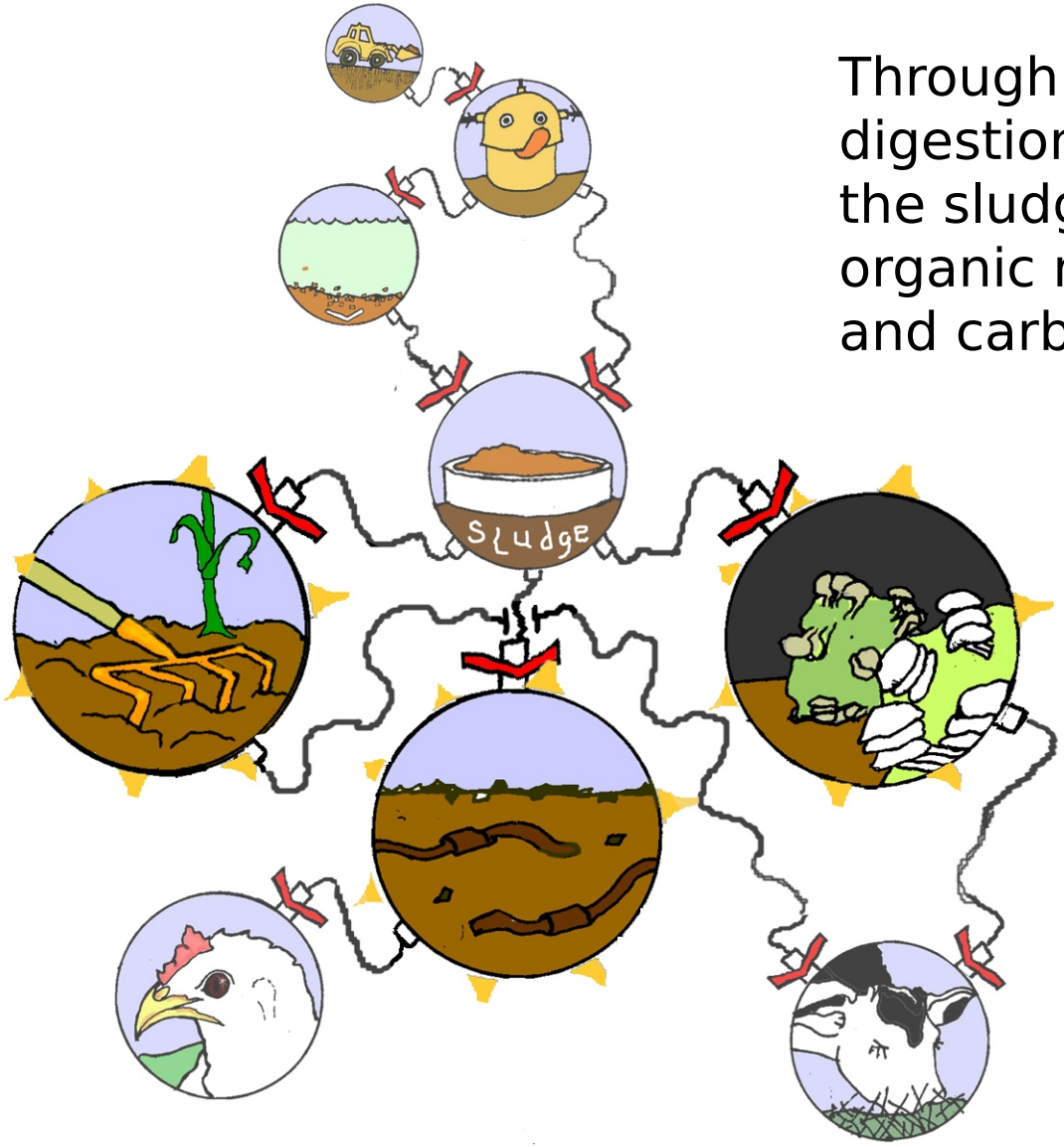
bacteria

fungus

In the IBS system, livestock waste is not only treated 100%, but it's by-products are also utilized 100%.

(The little carbon dioxide that does manage to escape is more than compensated for by the lush vegetation creating oxygen and acting as carbon sinks.)

In it's first 2-3 years the system will be self sufficient in terms of biogas energy production and fertilizer substitutes. After the 2-3 year 'incubation' period, the system will become self sufficient in terms of providing for all input livestock feed resources.



Through the processes of digestion and decomposition, the sludge has changed from organic material to nitrogen and carbon compounds.

- ✓Sludge (30-35%)
- ✓Biogas Energy (25-30%)
- ✓Effluent (30-35%)

algae

plant

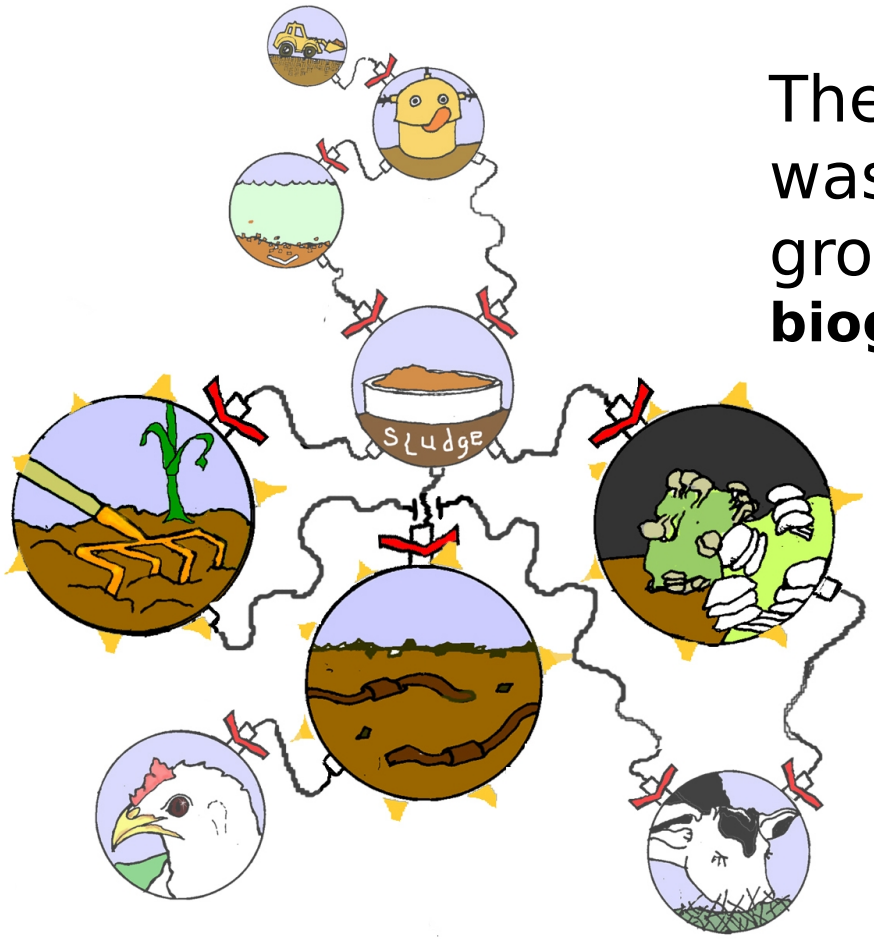
animal

bacteria

fungus

These are all used for maximum productivity.

Sludge By-Products

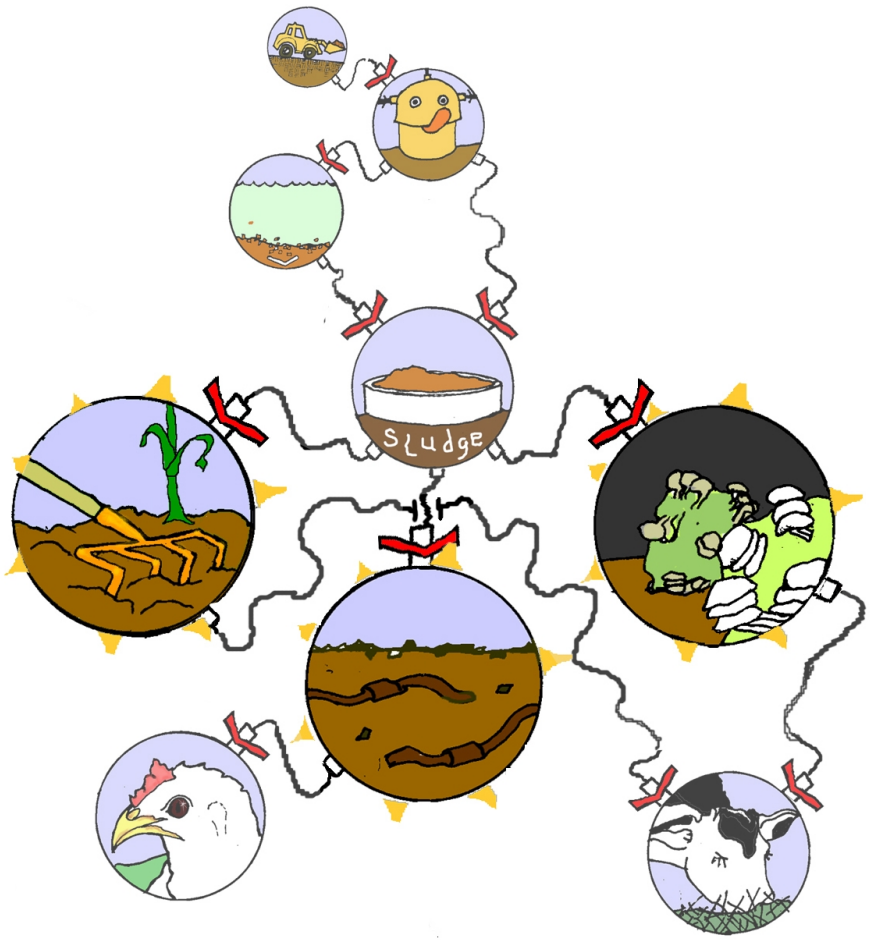


The resources from livestock wastes are divided into 3 groups:
biogas, effluent, and sludge.

The **sludge** stays inside the digester to act as an anaerobic blanket which slows down the movement of the heavier particles in the effluent.

The longer solids retention time in the digester breaks down the sludge more effectively and efficiently than conventional hydraulic methods.

This stabilized sludge is removed from the sedimentation basins and the digester tank regularly for use as compost, earthworm and mushroom cultivation.



The system itself has other by-products coming from the basins, ponds and adjacent crop cultivation, and from processing farm produce for sale. These byproducts can be used directly as feeds, and as crop substrate.

There is no waste.

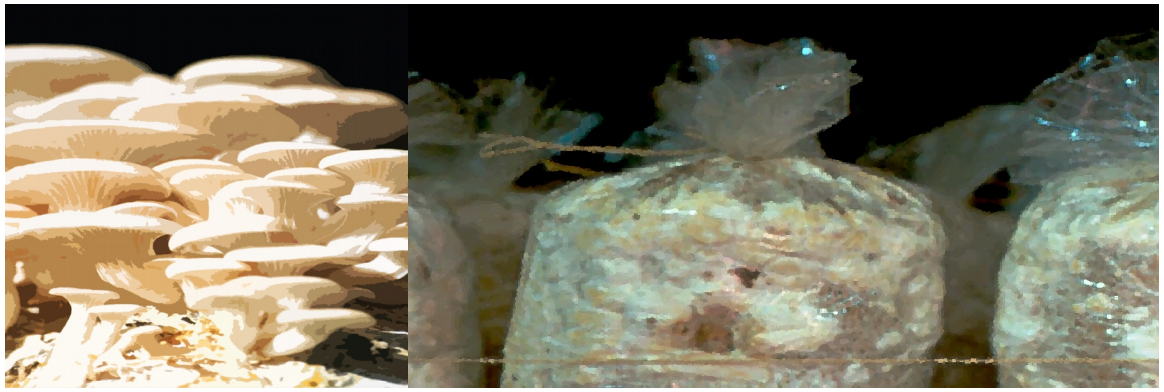
algae

plant

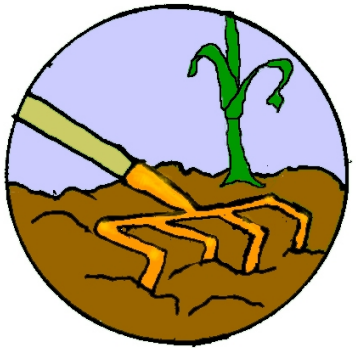
animal

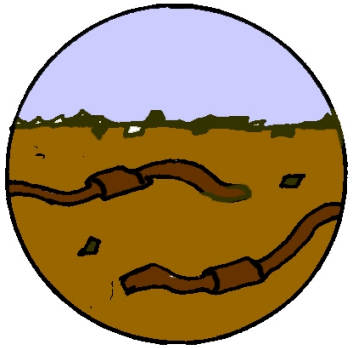
bacteria

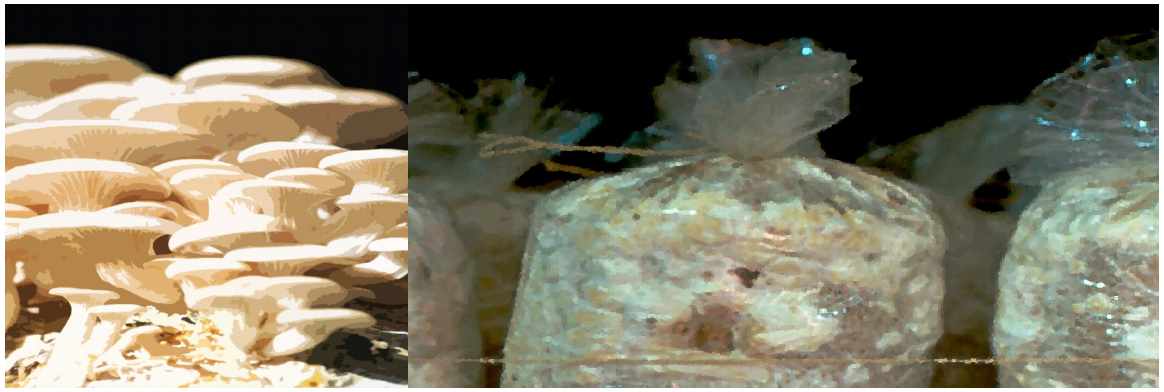
fungus

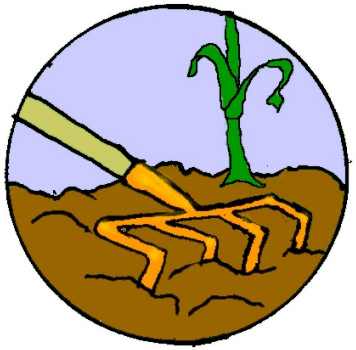


The **Biogas** generated from the anaerobic digester can be used for cooking and boiling, heat for young livestock, and sterilizing the substrate for mushroom culture.

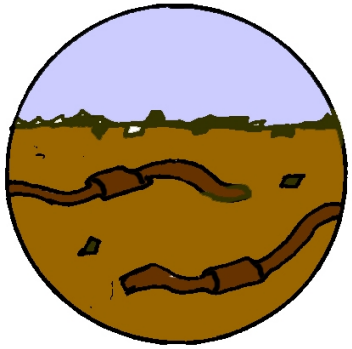


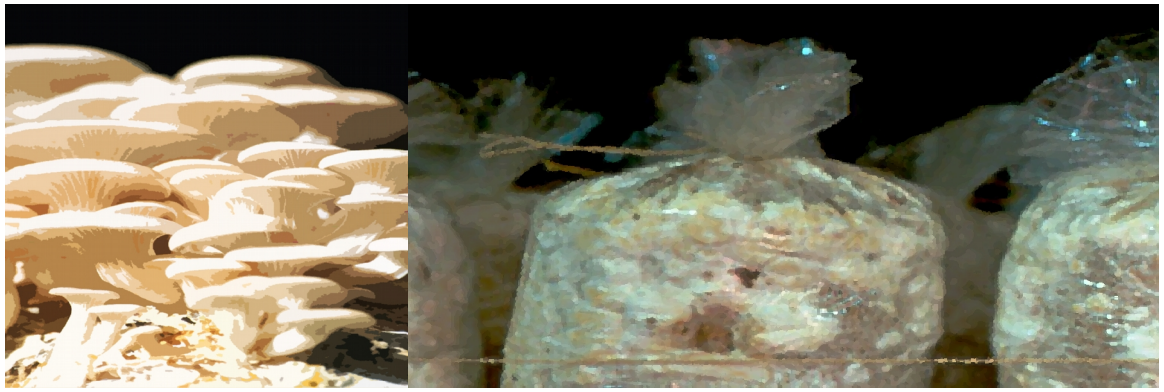




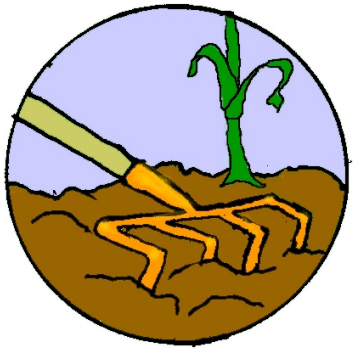


It can also be used in boilers, laundry facilities, gas powered machines, and for electricity production.

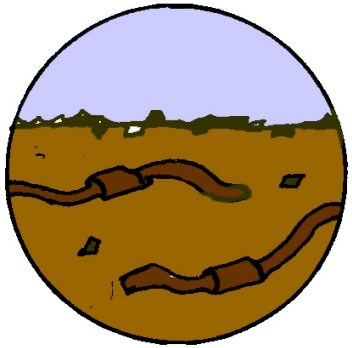




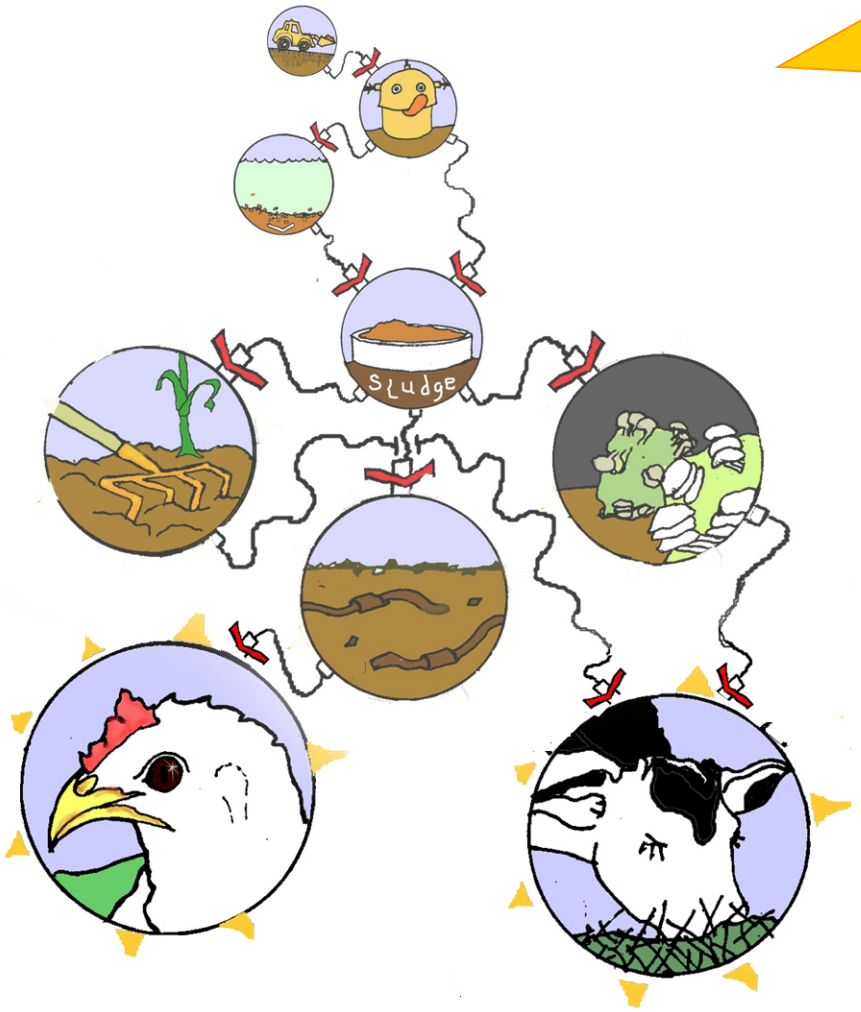
The **sedimentation** and **sludge** from the digester is recycled in the Integrated Biomass System for use as a **nutrient balanced mushroom substrate or soil amendment**.



These processes allow for the natural treatment of all remaining 'wastes' while producing useful Biomass for sale or input materials for other manufacturing processes.



totally random?



Crop remains can be wonderful as feeds, but must be cooked first to illuminate the possibility of disease.

(ask me why!)

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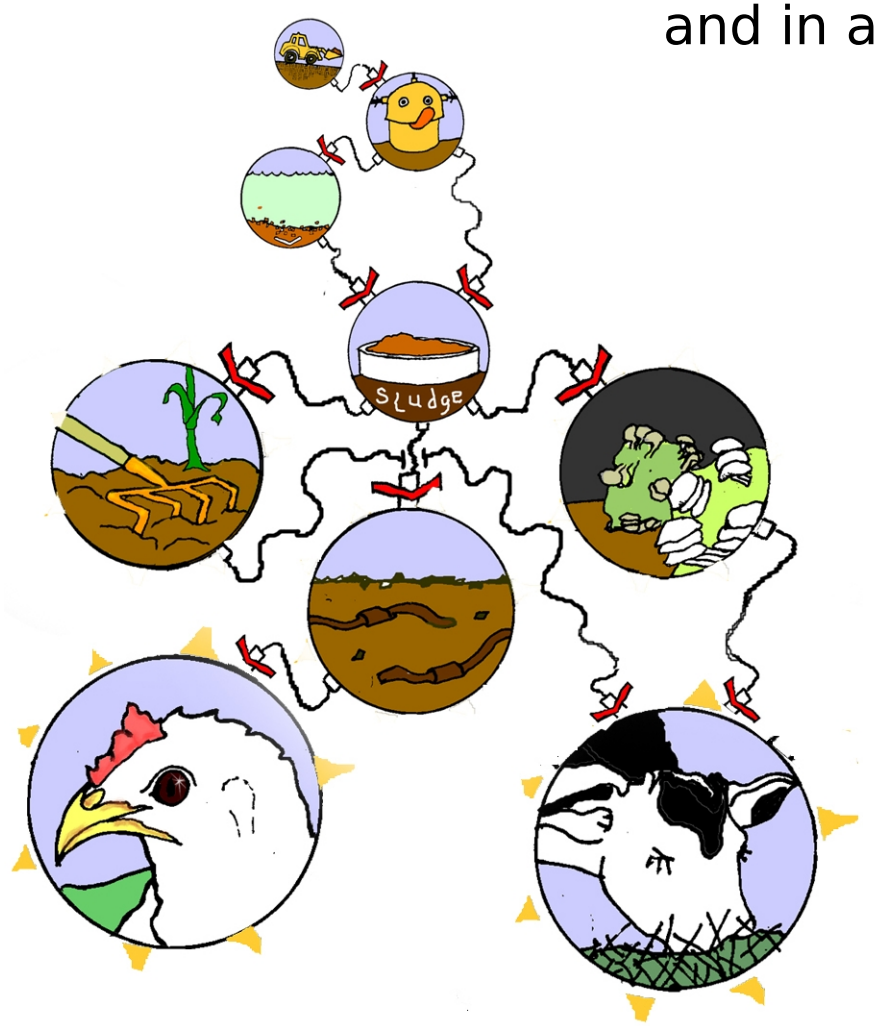
Assessment of Benefits

The Integrated Biomass System can remove many constraints both on farms and in agro-industry.



Its ability to totally recycle or reuse all wastes and byproducts while simultaneously preventing water, air and soil pollution (all problematic) is unequaled. This system will give you maximum yields for the lowest price.

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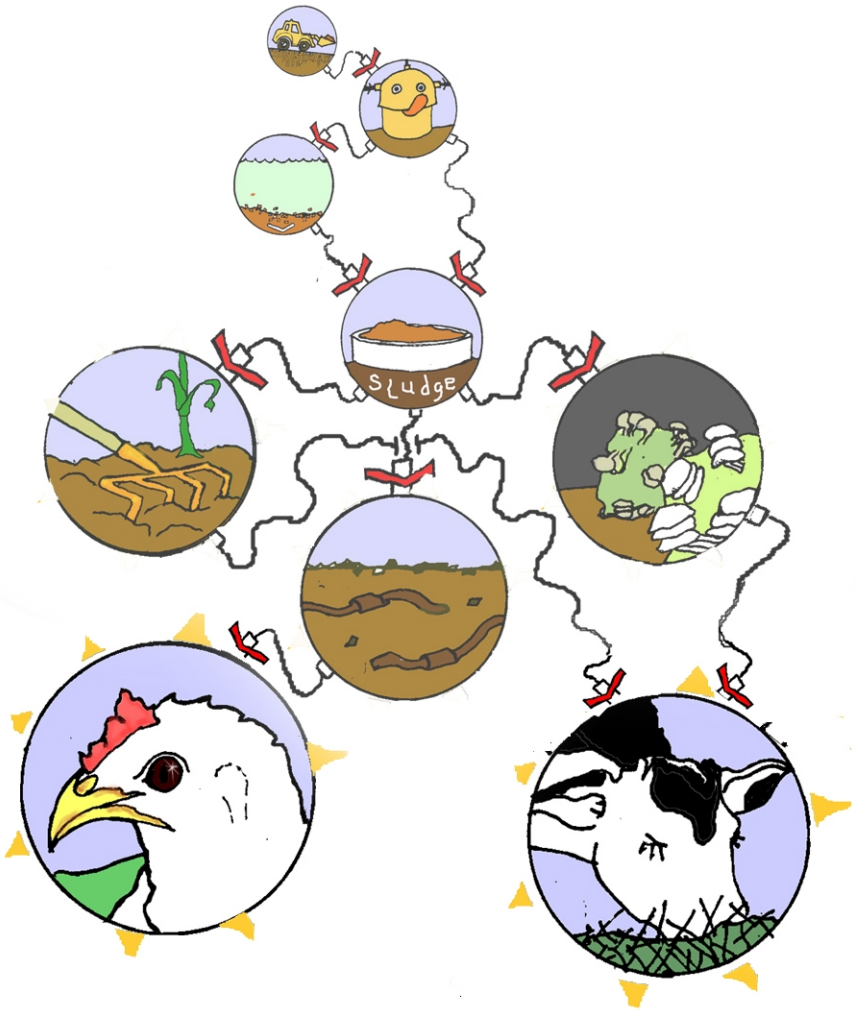
Livestock Benefits



✓ High-Protein Foods
(milk, eggs, meat, goods, etc.)

✓Daily Production of Wastes
(totally treated and recycled)

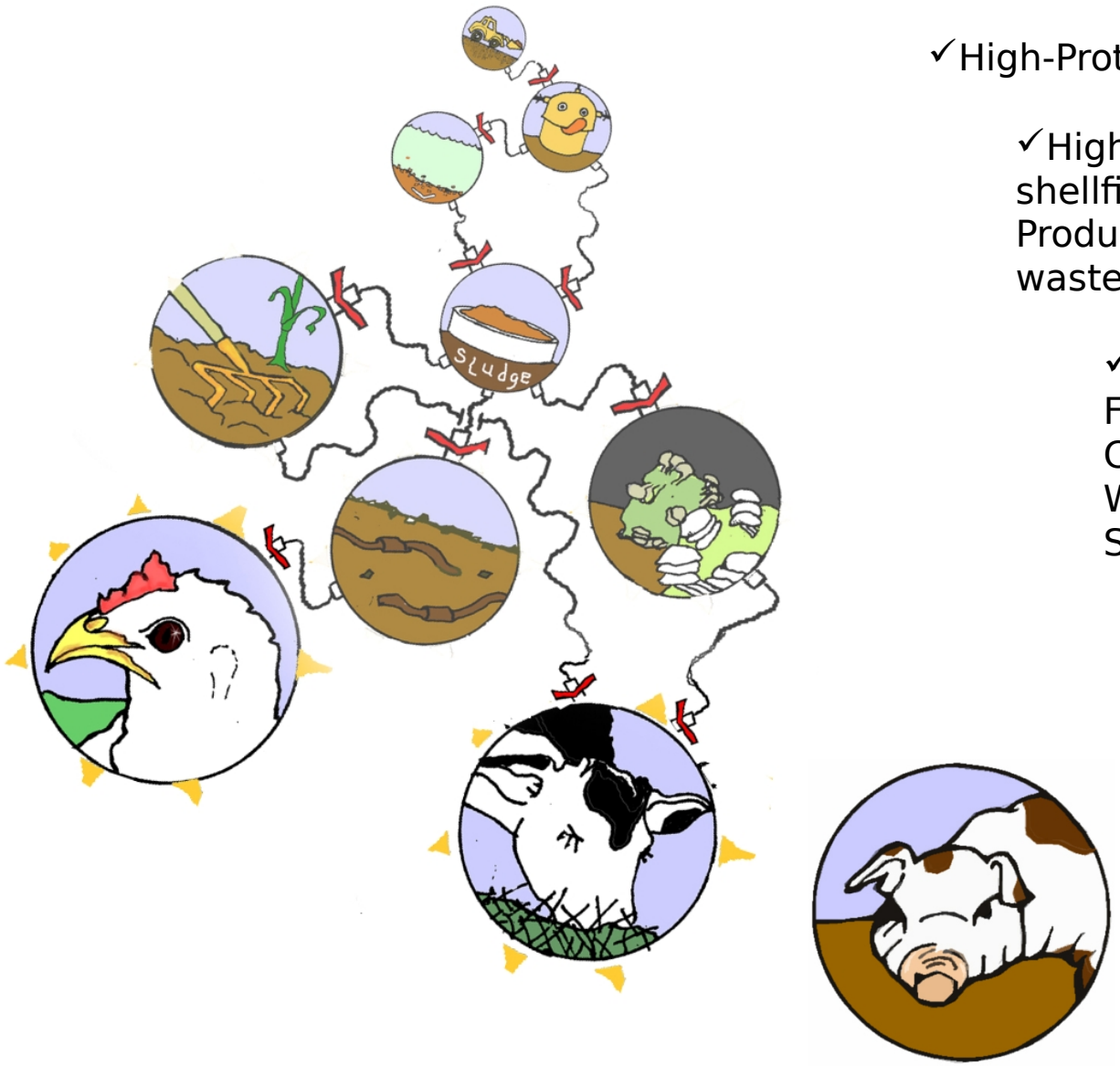
✓Daily Production of Biomass

(fuel, feed, food, fiber, etc.)

✓Uses FREE Fertilizers to boost up Fish and Crop Productivity

✓Uses FREE Fuel to Preserve & Process ALL Primary Produce

Fishery Benefits



✓High-Protein Feeds

✓High-Protein Foods (fish, shellfish, aquatic plants) - Daily Production of Wastes (fish wastes naturally treated)

✓Second Cycle of FREE Fertilizers to Boost up Crop Productivity on Both Water Surface & Surrounding Dykes.

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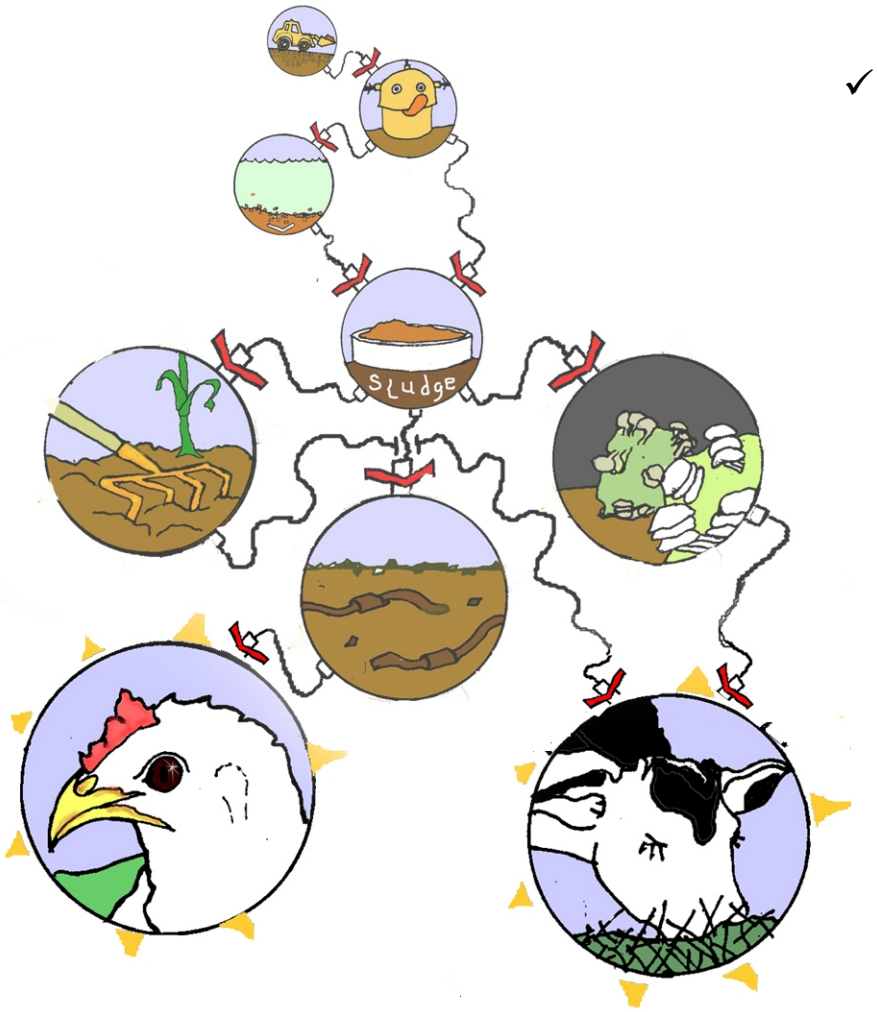
Crop Benefits

Huge Amount of Water and FREE Nutrients for Irrigation & Fertilization of Biodiversified Crops:

- ✓High-Quality Foods (grains, vegetables, fruits)
- ✓Big Production of Residues (compost, crop remains)
- ✓Fixation of Nitrogen with Selected Pulses and Trees
- ✓Few Agro-Chemicals Needed



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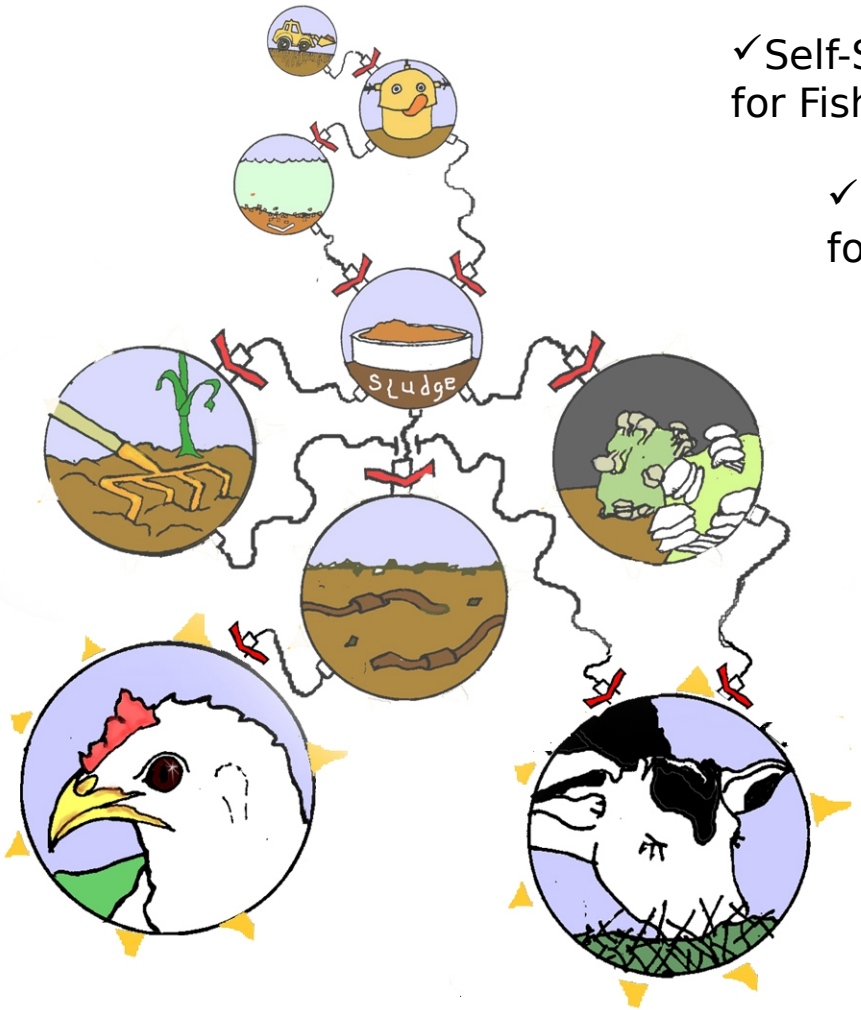
Tangible Benefits

✓Big Quantity of FREE Feeds Available for Livestock Self-Sufficiency in ENERGY & Organic FERTILIZERS.

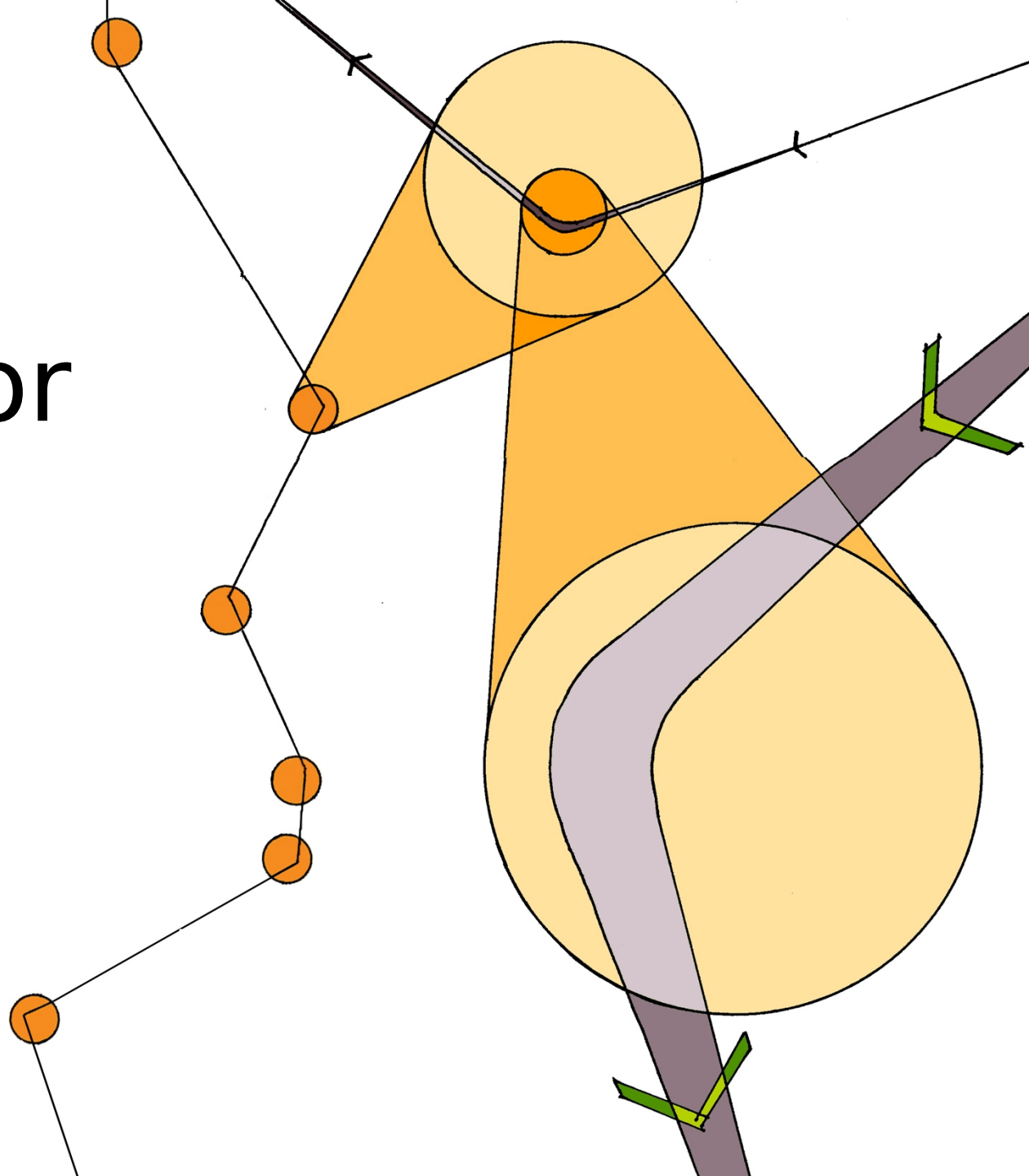
✓Self-Sufficiency in PLANKTONIC Feeds for Fish and Shellfish .

✓Self-Sufficiency in Raw MATERIALS for Agro-Industry.

✓NO Toxic CHEMICALS or Organic WASTES to Degrade Environment - Always COMPETITIVE because of Free Input.



Making a Case for Change.



This complete treatment of waste is:

- ✓**economic** because it produces livestock, fish, feed crops, sellable crops, all while treating the wastewater...
- ✓**ecological** because it uses all of the wastes as resources, leaving nothing behind to degrade the air, soil or water.
- ✓**ethical** because no hidden hormones or antibiotics are needed for growth stimulation.
- ✓**effective** because it incorporates naturally occurring processes in nature.
- ✓**clean** because it does not utilize any toxic agrochemicals to kill any unwanted organisms.
- ✓**safe** because it cleans the waste more completely than any other industrial or commercial process.
- ✓**sustainable** because it does not rely on any outside products or infrastructure to deliver results.

It is, as Paolo Lugari says, "**the farm of the future**".

Waste treatment is always very costly for any country and usually gets the lowest priority in local budget allocations.

Conventional Systems have a tendency to operate at a great loss, as the treatment methods demand new resources in order to feed the system. This necessitates higher service fees for the users; and because of the unpopularity of those fees, as a result rarely clear a profit. Worse still, the costly plants rarely operate as smoothly as advertised, and continuously ware down and break down with age.




Many very smart people, both in rich and developing countries, have already concluded that the huge expenses involved with conventional waste treatment practices are not worth the trouble and expense. Much research and effort is being spent globally on the development of innovative systems that are less expensive and more efficient. The Integrated Farming System (IFS) and the Integrated Biomass System (IBS) are both examples of cutting edge research based on natures wisdom.

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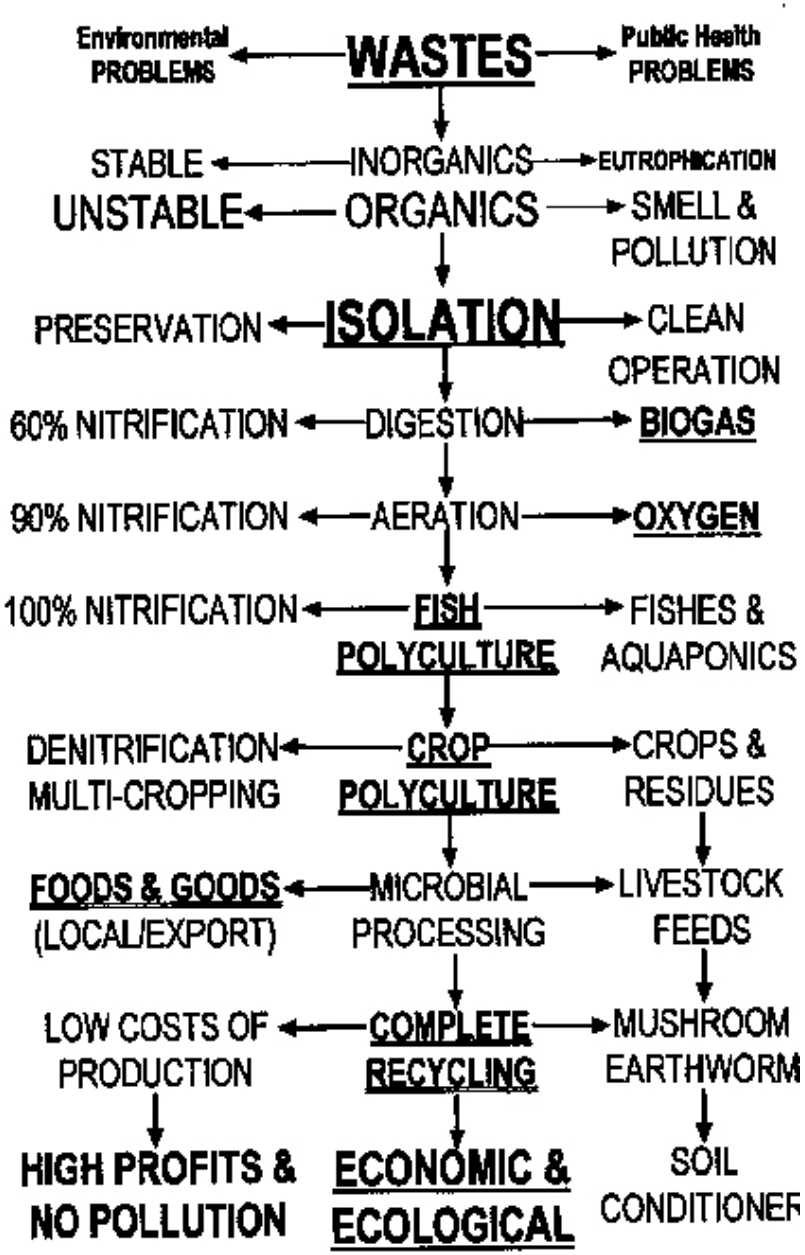
Sewage contains less than 1% organic material. This 1% is responsible for all the problems connected with wastewater treatment. It is compounded by the density, sprawl and scale built into the modern Urban Environment.

What conventional waste treatment practices do is concert that 1% organic material into inorganic pollutants, and thereby shift the composition and relocation of the waste. The scale and centralized design of conventional wastewater treatment facilities is another variable that magnifies the deleterious effects of resources lost, wastes produced, enormous expense, and debilitating inefficiencies of such systems.

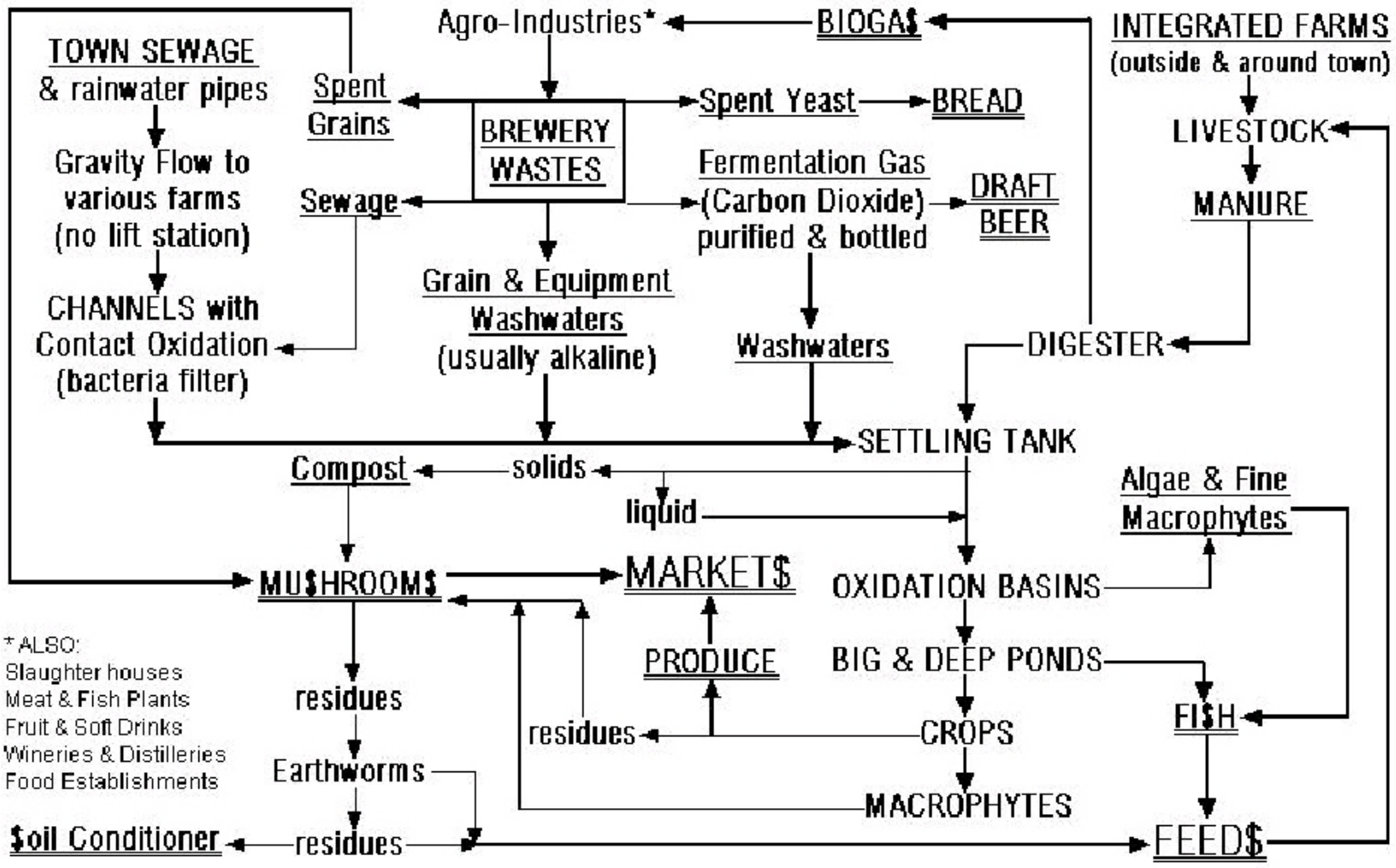

Environmental PROBLEMS
WASTES
Public Health PROBLEMS
STABLE
INORGANICS
EUTROPHICATION
UNSTABLE
ORGANICS
SMELL & POLLUTION
PRESERVATION
ISOLATION
CLEAN OPERATION
60% NITRIFICATION
DIGESTION
BIOGAS
90% NITRIFICATION
AERATION
OXYGEN
100% NITRIFICATION
FISH POLYCULTURE
FISHES & AQUAPONICS
DENITRIFICATION MULTI-CROPPING
CROP POLYCULTURE
CROPS & RESIDUES
FOODS & GOODS (LOCAL/EXPORT)
MICROBIAL PROCESSING
LIVESTOCK FEEDS
LOW COSTS OF PRODUCTION
COMPLETE RECYCLING
MUSHROOM EARTHWORM
HIGH PROFITS & NO POLLUTION
ECONOMIC & ECOLOGICAL
SOIL CONDITIONER


algae
plant
animal
bacteria
fungus

epaAS02
chan08/00

DECENTRALIZED WASTEWATER RECYCLING

Fig. 1






Much has been done in recent years to find alternative & innovative systems to deal with both human & animal wastes.

The ZERI IFS/IBS are the MOST successful systems available.

Integrated Farming and Biomass Systems completely treat all livestock and animal waste economically and ecologically, with saving to the local government authority and substantial profits for the farmer.

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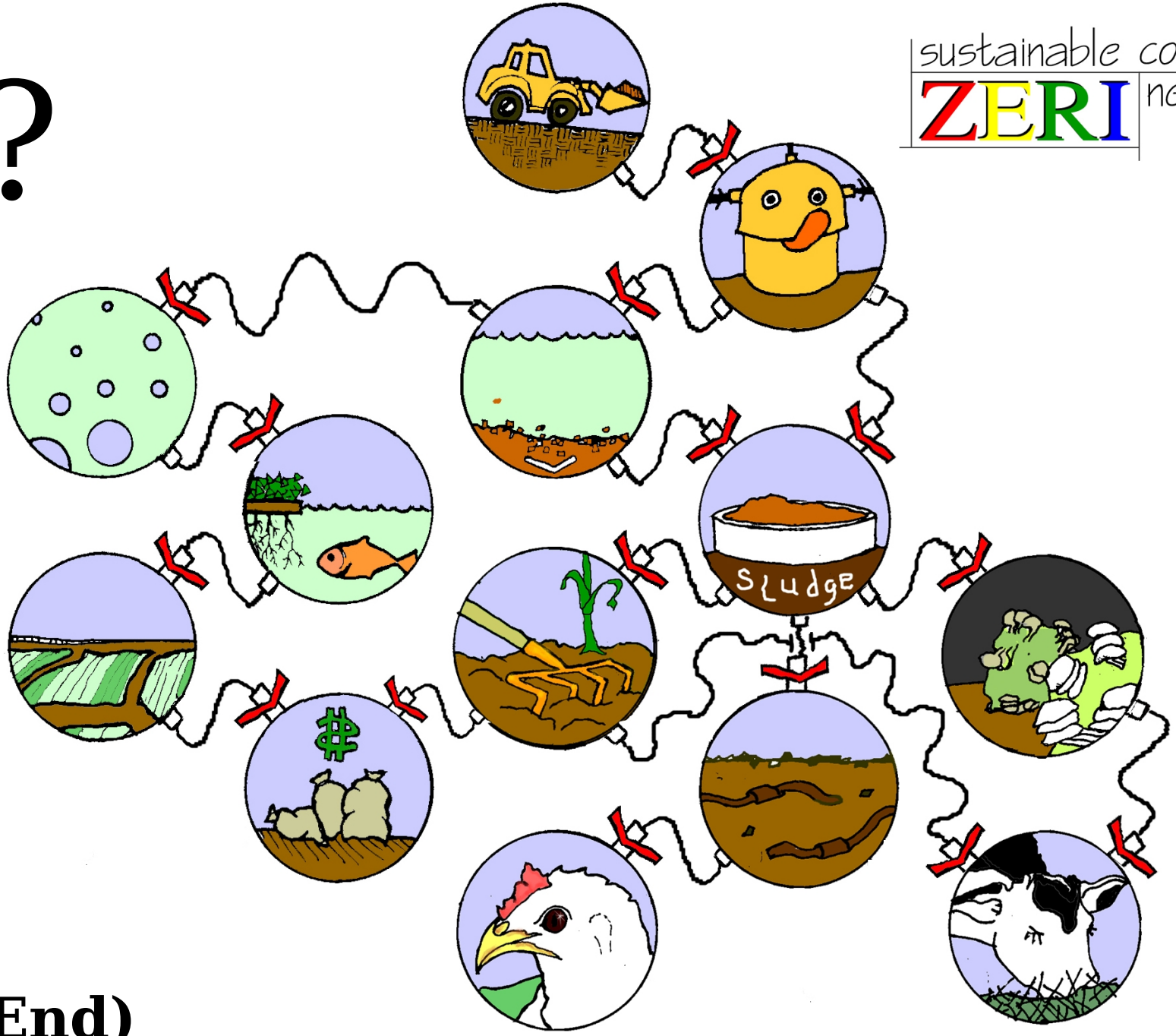
sustainable communities
ZERI new mexico



(End)