

ANNEX 1

| June 2008 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
|--|----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------------|--|-----------------------------|-----------------------------|--------------------|-----------------------|--------------------|
| Manure management DST mission (Burton, Menzi, Thorne, Chalernpao) | | | | | | | | | | | |
| Thailand AM | | Workshop | Counter-parts AIT | PMO Debrief | | | | | | | |
| Thailand PM | Internal mtg Planning | Workshop | Counter-parts AIT | Fly to China | | | | | | | |
| Venue | <i>Amari Watergate</i> | <i>DLD meeting room</i> | <i>AIT</i> | <i>DLD meeting room</i> | | | | | | | |
| China AM | | | | | Counter-parts (Liao) | Internal meeting - policy and mmgt teams | PMO Debrief | Workshop | | | |
| China PM | | | | | Counter-parts (Liao) | | | Fly to Vietnam | | | |
| Venue | | | | | <i>Hotel Canton</i> | <i>Hotel Canton</i> | <i>PMO office (DOA)</i> | <i>PMO Office (DOA)</i> | | | |
| Vietnam AM | | | | | | | | | Workshop | Counter-parts | PMO Debrief |
| Vietnam PM | | | | | | | | | Workshop | Counter-parts | Internal mtg |
| | | | | | | | | | <i>NCST</i> | <i>Desyloia Hotel</i> | <i>NCST</i> |
| Policy support mission (Backus, Steinfeld) | | | | | | | | | | | |
| Thailand AM | Regional WS | Regional WS | Regional WS | PMO Debrief | | | | | | | |
| Thailand PM | Regional WS | Regional WS | Regional WS | Fly to China | | | | | | | |
| Venue | <i>Amari Watergate</i> | <i>Amari Watergate</i> | <i>Amari Watergate</i> | <i>DLD meeting room</i> | | | | | | | |
| China AM | | | | | Internal meeting - policy team | - policy and mmgt teams | PMO Debrief | | | | |
| China PM | | | | | Internal meeting - policy team | - policy and mmgt teams | Fly to Vietnam | | | | |
| Venue | | | | | <i>Hotel Canton</i> | <i>Hotel Canton</i> | <i>PMO office (DOA)</i> | | | | |
| Vietnam AM | | | | | | | | | PMO Debrief | | |
| Vietnam PM | | | | | | | | | | | |

1. Workshops

- One full day – 8 hours including 1 hour lunch and two 15 min breaks (one mid-morning and one mid-afternoon) : 9am to 5pm
- Highly interactive sessions with 3 to 6 local experts including the nominated coordinators for data collection and the project engineer from the PMO.
- The day is broken into three sessions (after an introduction) each starting with a 15 minute overview from the indicated leader. Beyond this, this subject is broken down into the components as indicated with detailed discussion and precise feedback sought on each point. Vague notions and generalizations will be discouraged ! Crucial will be the input from the local experts which should make up more than 50% of the discussion. The day will end with conclusions and planning for follow on actions.
- The nature of the discussions will be a series of focused questions to lead discussion in a structured way. Both factual information and opinions are sought. Discipline on time will be important but in the event of incomplete resolution of any matter, note will be made in the minutes and further discussion will be planned (even if by e-mail exchange) at a later date.
- No discussion on data (covered previously in counterpart sessions)
- Minutes : these need to be detailed to ensure all ideas captured. Task split as shown with CHB to compile a single document from contributions from all three. This will form the core of the mission report in due course with a target date for release 14th July 2008.

| | | Leader | Minutes |
|----------|--|--------|---------|
| 09:00 to | Introduction | CHB | HM |
| 09:15 | Layout of the day and objectives | | |
| | Review of the environmental criteria of LWMEA project | | |
| 09:15 to | Session 1 : software (including “hands on” during discussions) | PT | CHB |
| 11:15 | Introductory presentation (15 minutes) | | |
| | Discussion 1: appearance and overall system structure | | |
| | Discussion 2: interactions and operation of software | | |
| | Discussion 3: output formats | | |
| | Discussion 4: other software matters | | |
| 11:15 to | Session 2 : manure handling and crops | HM | PT |
| 14:30 | Introductory presentation (15 minutes) | | |
| | Discussion 5: overall livestock farming patterns – pig, poultry and cattle – differences between large and small farms | | |
| | Discussion 6 : animal management practices including diet control options and the impact on manure composition. | | |

Schedules for LWMEA mission to Asia - June 2008

| | | | |
|----------|--|-----|----|
| | Discussion 7: water consumption – division into different operations – means of estimating water consumption if unknown | | |
| | Discussion 8 : manure collection from farms – separate collection of dung, mixed slurries, bedding (if used), wallows, | | |
| | Discussion 9 : application to crops – agronomic crop needs and risks (both perceived and real), cost and use of chemical fertilizers. | | |
| | Discussion 10 : techniques for manure application – solid and liquid – irrigation, spreading options, control of applied dose. | | |
| | Discussion 11 : transportation of manure and manure products – road access, vehicle cost, proximity of end users ... | | |
| | Discussion 12 : markets for manure and manure products – local and regional prices, market size, impact of chemical fertilizers ... | | |
| | Discussion 13 : sources and use of biogas and energy – actual uses of biogas (volumes), electricity consumption, local issues ... | | |
| | Discussion 14 : other agronomic matters | | |
| | | | |
| 14:30 to | Session 3 : treatment options | CHB | HM |
| 16:45 | Introductory presentation (15 minutes) | | |
| | Discussion 15 : overall manure treatment systems – combined processes, costs and consequences. | | |
| | Discussion 16 : storage - concurrent with most other processes, benefit of reducing pathogen numbers and targeted land applications | | |
| | Discussion 17 : separation – static screens, brushed screens, screw press, centrifuge | | |
| | Discussion 18 : sedimentation - gravity sedimentation, centrifuge, addition of lime | | |
| | Discussion 19 : composting options - windrows, forced aeration, turned pile, static pile, in-vessel, etc. | | |
| | Discussion 20 : aeration (liquid effluents) – its role in farm systems | | |
| | Discussion 21 : lagoons – single, multistage (2-5), covered lagoon (biogas), sediment removal issues, overlap with fish ponds, overflow. | | |
| | Discussion 22 : anaerobic digestion and energy production | | |
| | Discussion 23 : drying options - drying in shelters, solar drying in thin layers | | |
| | Discussion 24 : other treatment and engineering matters. | | |
| | | | |
| 16:45 to | Conclusions | CHB | PT |
| 17:00 | Actions to follow meeting – calendar of events | | |
| | Preparations ahead of the anticipated mission in the late autumn 2008 | | |

Suggested invitation lists – PMO to propose alternatives

Thailand :
 Dr Thammarat Koottatep (data collection coordinator)
 Dr Uthai Kanto (Kasserstat University)
 Dr Arux Chaikyakul (PMO)
 Dr Sommai Chatsanguthai (Project Engineer)
 Dr Dr Wimolporn Thitisak (PCD)
 Dr Nappadol Kongricharoern (Thai Environment and Energy Co Ltd).

China :
 Prof Liao Xin Di (data collection coordinator)
 Mr.Ou Jiyin (PMO)
 Dr.Ai Shaoying (Guangdong Agriculture Academy)
 Dr Rao (Project Engineer)
 Others

Vietnam :
 Dr (Mrs) Ngo Kim Chi (data collection coordinator)

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Dr (Mrs) Thuy Huynh (data collection coordinator)
Dr Phung Quoc Quang (Deputy director NAEC)
Dr Minh Hung Nyguyen (Soil and Fertilizer Society)
Dr Pham Van Duy (Dept of Animal Production)
Dr Bui Van Chinh (Project Engineer)

Schedules for LWMEA mission to Asia - June 2008

2. Meetings with data collection coordinators

- One full day – 8 hours including 1 hour lunch and two 15 min breaks (one mid-morning and one mid-afternoon) : 9am to 5pm
- Informal structure – smaller group than workshop – CHB, HM, PT plus the data coordinator(s).
- Objective – to review data collected item by item – morning session will concentrate on agronomic information (led by HM). Afternoon session will deal with installed plant (led by CHB).
- Collected data to be checked (a) in terms of source and reference, (b) that it's context is correctly understood (allowing for language difficulties) and (c) that it reflects typical values. In the event of unusual values (possibly the result of special regional factors for example) these must be confirmed as appropriate.
- For missing data, action lists will be needed to ensure that this is acquired within a realistic period (1 to 2 months?). Option of removing data subsequently noted as inappropriate for the software development.
- Suggested other contacts for data acquisition – note that the coordinator is not expected to be the source of data other than for that in his/her own area of expertise.
- Supplement data list (in addition to those already sent out in Apri/May).
- The development of the on-line database (PT) : presentation of first version and discussion on development over the coming months.

Suggested invitation lists

Data collection coordinators only expected to participate – option on including others can be considered.

Thailand : Dr Thammarat Koottatep

China : Prof Liao Xin Di

Vietnam : Dr (Mrs) Ngo Kim Chi (data collection coordinator – North)

Dr (Mrs) Thuy Huynh (data collection coordinator - South)

Schedules for LWMEA mission to Asia - June 2008

3. De-brief sessions with PMO's

- Half day – 3 to 4 hours with following 1 hour lunch and : 9 am to midday or latest 1 pm. Very limited option to extend meeting. In all cases, this session represents the final activity for the country with departure mid to late afternoon necessary.
- Objective – to present progress and plans to the PMO on the development of the software package. After an introduction (CHB), a demonstration will be given of the package (PT) supported by brief outlines by HM and CHB on the underlying principles.
- Invitation of feedback from the PMO to the presented software and its development plans.
- For the developing team, there will be included any specific requests to the PMO for further inputs of information as found necessary from the previous 2 days.
- Separately from the software package development, the PMO are offered the option to present on progress on the installation of systems in the study areas – discussion of technical matters arising as deemed appropriate.
- Any other related matters.

Suggested invitation lists

PMO plus others requested by the PMO.

Data collection coordinators also welcome to participate.

Thailand : Dr Thammarat Koottatep

China : Prof Liao Xin Di

Vietnam : Dr (Mrs) Ngo Kim Chi (data collection coordinator – North)

Dr (Mrs) Thuy Huynh (data collection coordinator - South)

ANNEXE 3

Le Cemagref

Livestock Waste Mangement in East Asia


Working title: MAUREEN (MANure Utilisation for REcovery of Energy and Nutrient)

De-brief session 19 June 2008

eau - territoires - développement durable

**Mission to Asia
June 2008**

Introduction

Working title: MAUREEN (MANure Utilisation for REcovery of Energy and Nutrient) Mission to Asia, June 2008 

► Time frame of activities

| | |
|-----------------|--|
| Dec 07 | Contract signed and first meeting (Rome) |
| Feb 08 | Préparation of questionnaires for collecting required data (HM & CHB) |
| March 08 | Meeting of the European group – confirmation of programme structure (All) |
| June 08 | Workshop in Aisa with regional partners from China, Thailand and Vietnam |
| Sept 08 | First complete draft of programme |
| Dec 08 | Project meeting (Asia) for evaluation of second version of the software package |
| March 09 | Final version plus support text |
| May 09 | Second workshop in Asia – official launch of the software (including name finally chosen !) |

Working title: MAUREEN (MAnure Utilisation for REcovery of Energy and Nutrient) Mission to Asia, June 2008



► Lay out of the day and objectives

| | |
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| | Discussion 5: overall livestock farming patterns – pig, poultry and cattle – differences between large and small farms |
| | Discussion 6 : animal management practices including diet control options and the impact on manure composition. |
| | Discussion 7: water consumption – division into different operations – means of estimating water consumption if unknown |
| | Discussion 8 : manure collection from farms – separate collection of dung, mixed slurries, bedding (if used), wallows, . . . |

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► Lay out of the day and objectives

| | |
|----------|---|
| | Discussion 9 : application to crops – agronomic crop needs and risks (both perceived and real), cost and use of chemical fertilizers. |
| | Discussion 10 : techniques for manure application – solid and liquid – irrigation, spreading options, control of applied dose. |
| | Discussion 11 : transportation of manure and manure products – road access, vehicle cost, proximity of end users ... |
| | Discussion 12 : markets for manure and manure products – local and regional prices, market size, impact of chemical fertilizers ... |
| | Discussion 13 : sources and use of biogas and energy – actual uses of biogas (volumes), electricity consumption, local issues ... |
| | Discussion 14 : other agronomic matters |
| 14:30 to | Session 3 : treatment options |
| 16:45 | Introductory presentation (15 minutes) |
| | Discussion 15 : overall manure treatment systems – combined processes, costs and consequences. |
| | Discussion 16 : storage - concurrent with most other processes, benefit of reducing pathogen numbers and targeted land applications |

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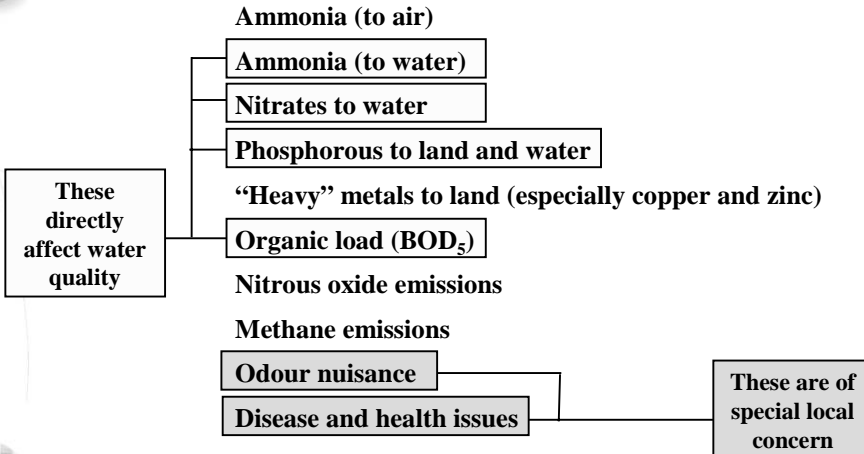
► Lay out of the day and objectives

| | |
|----------|--|
| | Discussion 17 : separation – static screens, brushed screens, screw press, centrifuge |
| | Discussion 18 : sedimentation - gravity sedimentation, centrifuge, addition of lime |
| | Discussion 19 : composting options - windrows, forced aeration, turned pile, static pile, in-vessel, etc. |
| | Discussion 20 : aeration (liquid effluents) – its role in farm systems |
| | Discussion 21 : lagoons – single, multistage (2-5), covered lagoon (biogas), sediment removal issues, overlap with fish ponds, overflow. |
| | Discussion 22 : anaerobic digestion and energy production |
| | Discussion 23 : drying options - drying in shelters, solar drying in thin layers |
| | Discussion 24 : other treatment and engineering matters. |
| 16:45 to | Conclusions |
| 17:00 | Actions to follow meeting – calendar of events |
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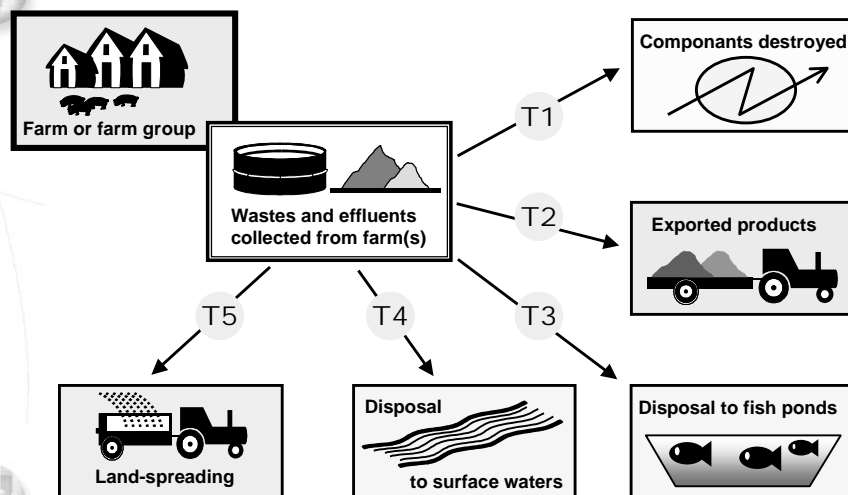
► Which pollution abatement issues?



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► Disposal routes for manures




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Over view of programme (PT)

Agronomic issues (HM)

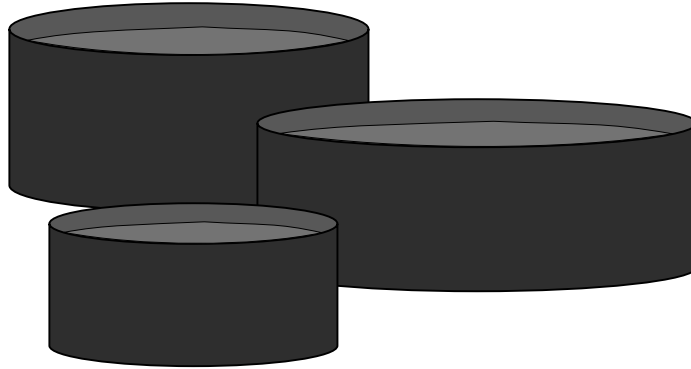
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Treatment options

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▶ **Manure storage options**



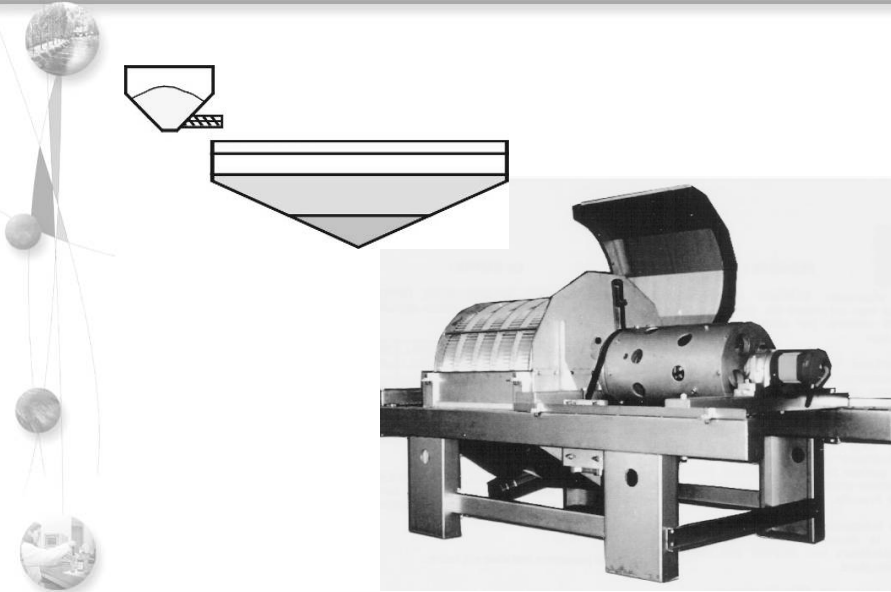
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▶ **Solids separation – run down screens**



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▶ Sedimentation and centrifugation



Working title: MAUREEN (MAnure Utilisation for REcovery of Energy and Nutrient) Mission to Asia, June 2008 

▶ Composting equipment



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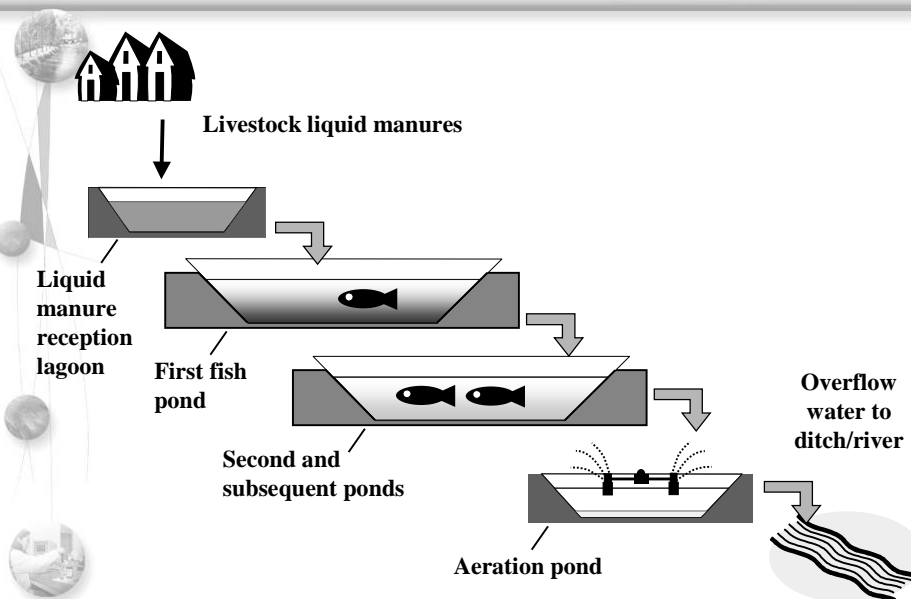
▶ Aeration systems



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▶ Lagooning schemes



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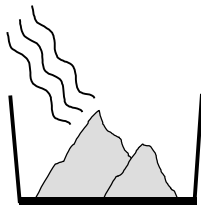
▶ Biogas options



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▶ Drying schemes



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Conclusions

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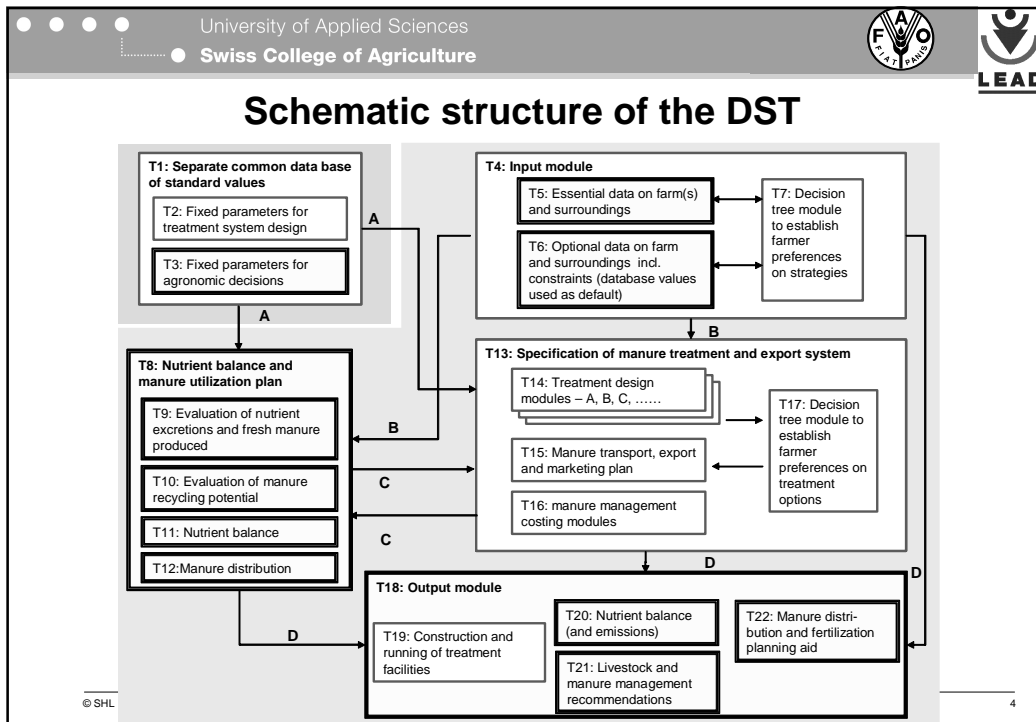
LIVESTOCK WASTE MANAGEMENT IN EAST ASIA

Decision support tool on manure management practice: Workshop June 2008

Livestock and manure handling and recycling on crops

National workshop June 24 2008

- Aims
 - Consult national experts on important aspects (decisions what to include etc.)
 - Gather inputs and recommendations for the selected approach (not default values for standard production)
- Consultation and discussion
 - **Livestock production**
 - **Water consumption**
 - Manure collection
 - **Recycling on crops** (and fish)
 - Manure transport
 - Manure spreading
 - Markets for manure and manure products



University of Applied Sciences
Swiss College of Agriculture

FVO
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LEAD

Livestock production

- Focus is on intensive production
- Feeding and production data
 - Default values for standard production
 - Possibility to use farm-specific data
- What do we need to know about the housing type apart from the manure collection system ?

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Water consumption

- The amount of water used is crucial for the amount of liquid manure.
 - If it is not known, it has to be measured or estimated in detail
 - The DST can provide recommendations how to estimate (e.g. measuring flow rate of flushing hoses and minutes of hosing, water tower)
 - How large is the variation in water use between farms ?
- Is there a large seasonal variation in water use ?
- Must water used for washing at the end of the cycle be considered separately ?

Recycling on crops

- What land is suitable for manure application ?
What are main restrictions ?
 - Readiness of crop farmers to use manure
 - Crop
 - Accessibility
 - Soil type
 - Other ?
- Who is involved in the discussion of constraints to manure recycling on crops
 - Local extension officers or other experts ?
 - Livestock producer ?
 - All, selected or no potential manure users ?

Recycling on crops (3)

- In what detail should we know where crop farmers are ready to use manure ?

- E.g. list on what crop what manure is accessible

| | liquid | solid fresh | solid dried | sludge digester | sludge lagoon |
|---------|--------|-------------|-------------|-----------------|---------------|
| rice | – | – | + | – – | – |
| wheat | + | + | – | – | + |
| cassava | + | ++ | – | + | + |
| orchard | + | ++ | ++ | – | + |

- Should we know why they are not ready to use manure
 - A list of potential constraints (proven or feared risks) which can be tagged if seen to be problematic? (E.g. negative effect on yield or quality; hygiene; social restrictions; tradition)
- Are the feared restrictions accepted, even if scientific experience to contradict them is existing ?

Recycling on crops (2)

- How to determine surface available for manure recycling on neighbouring farms
 - Assumptions of livestock holder ?
 - Existing contractual agreements ?
 - Contacts with every potential crop farm ?
- How to consider accessibility ?
 - Quality of road or path
 - Dry/rainy season
 - Plot accessible for machines
- How to consider distance
 - Distance classes (e.g. <500 m, 500-1000 m, 1-2 km, 2-4 km, >4 km)

Recycling on crops (4)

- Crop nutrient requirement or uptake ?
 - Requirement appropriate for fertilization; familiar to farmers
- What should be considered to determine dosing ?
 - P or N requirements of crops ? (AWI: P)
 - 100% of requirements or more or less (AWI: 150% of P)
 - Nutrient status ? Soil type ? (AWI: not feasible)
- What percentage of total N applied to crops is considered to be available for crops ?
 - Liquid manure: 60%, more, less (AWI: 70 %)
 - Solid manure: 40%, more, less (AWI: 30%)
- What safety margin must be considered for dimensions of facilities ?
 - 100 % of crop land available according to knowledge in the planning phase
 - Less than 100 % to allow for partners dropping out and uncertainties

Recycling in fish production

- Who could provide reliable data ?

Manure transport

- What techniques are available and should be differentiated ?
 - Truck
 - Tractor
 - Animal pulled
 - Pipes
 - Canals
- What accessibility criteria must be considered ?
 - Road or path category or accesibility table for techniques
 - Differentiated for dry and wet season ?
 - For each of the above techniques ?
- Costs locally inquired or “standard values” from DST ?
 - Cost for equipment
 - Labour costs

Manure transport (2)

- Special questions for pipes
 - Above or below ground
 - Permanent or movable
 - Possibility to cross land of neighbour
 - Potential barriers (e.g. roads)

Manure application

- What techniques are available and should be differentiated ?
 - For liquid manure ?
 - For solid manure ?
- Differentiation of seasons
 - What seasons should be differentiated ?
 - Restrictions for specific seasons ?
- Manure application only when there is actually a crop up-take or also at other times with no restrictions ?

Markets for manure and manure products

- How well can the future development of the manure market be predicted ?
- What forms of marketable manure should be differentiated ?
- What distances of manure market to manure source should be differentiated ?
- How to deal with the potential fluctuation of the market demand and price for manure ?
 - Very restrictive assumptions or current situation ?
 - What would happen with our systems if the market breaks down ?

ANNEXE 4

