

Livestock Waste is Gold 畜禽废弃物是黄金

towards a sustainable livestock production in Heilongjiang with profitable livestock waste recycling
在黑龙江建立一个可持续的畜生产，有利润的畜废物回收

A business case for Dutch knowledge and innovative technology in livestock waste recycling to contribute to converting the Heilongjiang livestock waste problem into sustainable livestock production, with crop fertilization and compounds as valuable outputs

荷兰知识和创新技术在畜禽废物回收方面的商业案例，有助于将黑龙江畜禽废物问题转化为可持续的畜生产，包括农作物施肥和复合肥作为有价值的产出。

Supported by Heilongjiang Animal Husbandry and Veterinary Bureau in cooperation with
Qiqihar Animal Husbandry Bureau (QAHB) and
Heilongjiang Animal Science Institute in Qiqihar (HASIQ)
由黑龙江省畜牧兽医局支持，与齐齐哈尔市畜牧兽医局、黑龙江省畜牧研究所合作。



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2017 timeline SMP 17016

- May: approval TKI Agrifood (late in 2017 growing season)
- June: first investigation visit to Qiqihar for fact finding (WUR Yan Jie and EP)
 - Heilongjiang Animal Science Institute in Qiqihar (HASIQ, Mr. Liu)
 - Qiqihar Animal Husbandry Bureau (QAHB, Mr. Qi)
 - Get some feeling for HLJ/Qiqihar situation and prerequisites
 - Approval to extend SMP to 2018 growing season
- July: Project Proposal Dutch manure solution QAHB/HASIQ
- September:
 - EP meeting with HASIQ, Mr. Liu and QAHB, Mr. Qi follow-up
 - WUR YAN Jie present Dutch standards/legislation to HAHB
- October: EP and WUR participating/presentation during Dutch Manure Innovation Mission



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Heilongjiang situation 黑龙江省情况

- Food producing province, very fertile soil, short growing season
- 粮食生产大省·非常肥沃的土壤·生长期短
- Large scale livestock farms, no land, no connection to arable farms
- 大型畜禽养殖场，没有土地·与耕地农场无联系
- Lack of standards, legislation: locally big manure problem
- 缺少标准、立法：当地严重的粪污问题
- Reduce use synthetic fertilizers: green and organic food production
- 减少使用化肥：有机食品和绿色食品的生产
- Local feed for local cows
- 种养结合



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Heilongjiang situation 黑龙江省情况

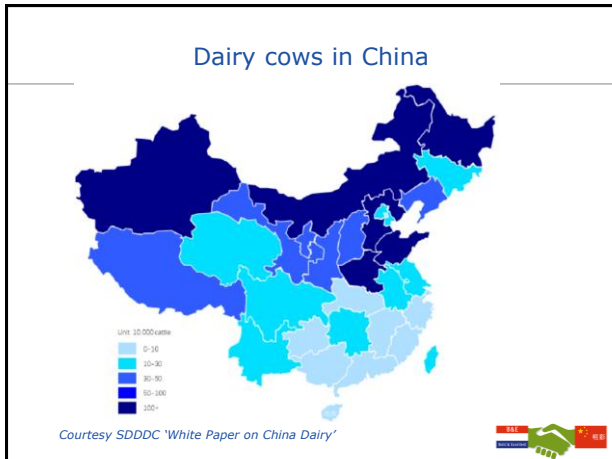




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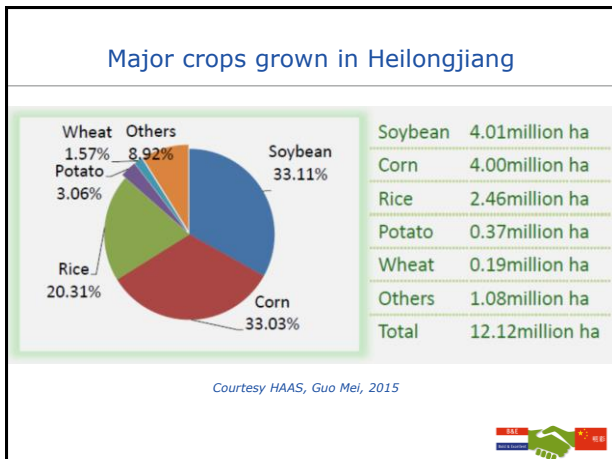
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Qiqihar / Heilongjiang livestock farms

QIQIHAR	# animals	# farms	Average
#pigs	7.6 Million	340	22k/farm
#beef cattle	1.7 Million	100	17k/farm
#dairy cows	400k	90	4.4k/farm
#poultry	68 Million	60	>1M/farm
Total manure/yr.	4 Million ton	Arable land	2.25 M hectare
HEILONGJIANG			
#pigs	12.75 Million	(sows 1.2 M)	
#beef cattle	3.15 Million		
#dairy cows	1.76 Million		
#poultry	150.85 Million		
Total manure/yr.	120 Million ton	Arable land	15 Million hectare
NETHERLANDS	68.6 Million ton		1.9 Million ha.

Courtesy Qiqihar Animal Husbandry Bureau, Mr. QI Xiaotong, 2017

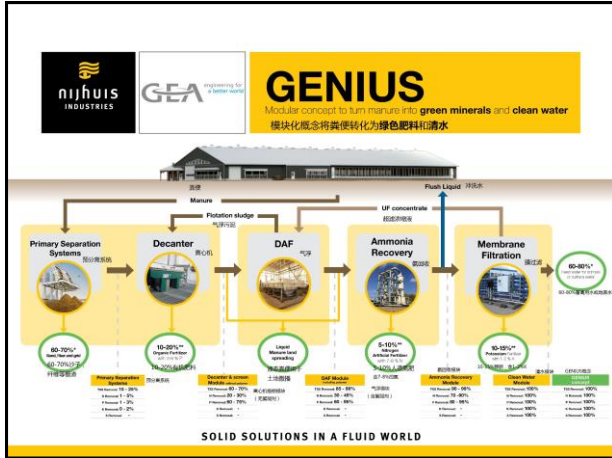
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Proposed concept

提出的概念

- Distribute on arable fields on short and mid-range distances (<200km). Veenhuis solution
- 施用在中距离和中距离的耕地上 (小于200km)
- Combined with central processing into nutrient concentrates for transport over longer distance. Nijhuis solution
- 结合集中加工成营养浓缩物, 利于更远距离运输
- Contribute to 'local feed for local cows': grass/alfalfa enhance economic feasibility of manure incorporation
- 为当地奶牛提供当地饲料"种养结合": 牧草/苜蓿提高粪肥施用的经济可行性

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Distribution manure/fertilizer > 1.000's km
粪污/肥料远距离施用 >1千公里

1立方米的粪污可以转化为

1 m³ manure turned into:

- Clean water (干净的水)
- Solid fraction with phosphate (含有磷的固体颗粒)
- Nitrogen artificial fertilizer (氮人工肥)
- Potassium Fertilizer (钾肥)

含有磷的固体颗粒 氮人工肥 钾肥

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Manure storage on the field, not on the livestock farm
在田间的粪污储藏 · 不在牧场

250 m³ 250 m³ 250 m³

€5-20/ton < 200 km

5-20欧/吨

2,500 m ³	2,500 m ³	2,500 m ³	2,500 m ³	2,500 m ³	2,500 m ³	2,500 m ³	2,500 m ³
50 ha公顷	50 ha公顷	50 ha公顷	50 ha公顷	50 ha公顷	50 ha公顷	50 ha公顷	50 ha公顷
750 mu亩	750 mu亩	750 mu亩	750 mu亩	750 mu亩	750 mu亩	750 mu亩	750 mu亩

agrifirm plant

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Aim of the project

- Set-up a demonstration pilot in Qiqihar county that has urgent livestock waste problem. Cooperate with
- HASIQ: 1.200 cow dairy farm and 1.500 sow farm for research and demonstration purposes
- QAHB: 10.000 dairy cow farm

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Project aims: research and prepare (1)



- Standards and legislation:
 - Use Dutch history and experience to create feasible standards and legislation in Heilongjiang (WUR/HAHVB/HASI)
- Distribution:
 - **Make overview** and connect livestock and arable farms in Qiqihar area (WUR/HAHVB)
- Cold area, short growing season:
 - Adaptations of livestock waste spreading necessary for these climate circumstances? (WUR/HASI)
- Grass/alfalfa:
 - Inventory of seeds/varieties that are suitable for the local circumstances/climates. (WUR/HASI)
 - **Inventory of necessary equipment in the area.** (WUR/HASI)
 - Economic calculation of feasibility of local grass/alfalfa growing. (WUR/HASI)



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Project aims: research and prepare (2)



- Knowledge exchange:
 - Calculation of value and improve perception of livestock waste for arable farming (WUR)
 - Manure sample analysis (WUR)
 - Advise on nutrient use for crops and grass/alfalfa (Agrifirm)
- Demonstrate equipment and solutions:
 - **Investigate size/capacity/spec for livestock waste spreading equipment**, do first demonstrations (Veenhuis)
 - **Investigate size/capacity/spec of centralized livestock waste processing equipment** (Nijhuis)
- Sino Dutch Livestock Waste Recycling Centre (SDLWRC):
 - Utilize and further develop the combined knowledge and experience of SDLWRC for China (WUR)



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Learnings/challenges in 2017

到目前学习到的/挑战性

- | | |
|---|--|
| <ul style="list-style-type: none"> • Heilongjiang government <ul style="list-style-type: none"> - Soil organic matter is degrading, program to protect black soil - Slurry incorporation considered best method • Manure 'pollution': heavy metals, hormones, antibiotics • Arable farmers <ul style="list-style-type: none"> - Often small farmers on large field. Cannot do capital investment - No connection with soil, don't have long term use of same field - No interest in soil improvement, only interest is crop fertilization - Fertilizing during planting, prefer granulate - Big concern about heavy metals • Challenging climate, only short season slurry incorporation • No manure analysis • Limited grass/alfalfa knowledge/infrastructure • No standards, no legislation, no law enforcement | <ul style="list-style-type: none"> ● 黑龙江政府 <ul style="list-style-type: none"> • 土壤有机质的减少, 保护黑土计划 • 原液还田是最好的方法 ● 粪污污染: 重金属, 激素, 抗生素 ● 耕地农户 <ul style="list-style-type: none"> • 小农户分种大块土地, 不能大投资 • 不长期使用同一地块, 与土壤无关联 • 对土壤改良无兴趣, 只对作物施肥 • 更喜欢使用颗粒肥, 与播种同时进行 • 对重金属顾虑很大 ● 挑战气候, 只有短暂的原液施用时间 ● 无粪污检测 ● 有限的牧草/苜蓿知识/设备 ● 无标准, 立法, 不强制 |
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Preliminary conclusions 2017

- Solution manure 'pollution' heavy metals:
 - Short term: only use dairy cattle manure for incorporating in fields
 - Longer term: prevent heavy metals from feed (not in project scope)
- Manure analysis
 - Create platform/labs for manure analysis
 - Train/educate/demonstrate arable farmers in NPK and advantages of organic manure and how this can work in China
- HASIQ:
 - Role: demonstrate manure incorporation in field (Veenhuis)
 - Role: manure analysis
 - 1.200 cow farm starting-up, limited budget to buy cows, no cow manure
 - No budget to invest in Veenhuis injector.
 - Continue with HASIQ if no money/manure?
- QAHB:
 - Possible subsidized project to set-up factory Livestock Manure Recycling Center (Nijhuis)
 - Will only work if sales/distribution of the output minerals is organized.
- Grass/alfalfa
 - No knowledge/infrastructure for professional grass/alfalfa forage production
 - Lely grass forage equipment from previous Lely project not available
- Connection with RVO Manure Innovation mission (October)
- **Question: proceed in Qiqihar, or other area?**



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Steps 2018

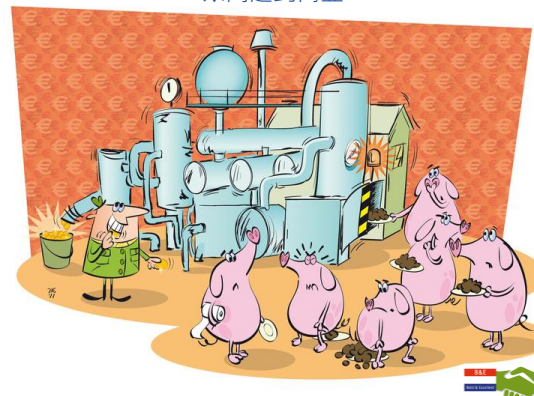
- Answer: proceed in Qiqihar or other area
- List as in project aims
- HASIQ:
 - Use Veenhuis from Sifang
- QAHB:
 - Find partner for cooperating/selling 'green minerals'
 - Make ROI calculations if business feasible for Nijhuis
 - If ROI positive and partner, further work-out project with Nijhuis
- Grass/alfalfa
 - Further look for grass/alfalfa equipment in Qiqihar area
- **Connect to Livestock Waste Innovation mission**
 - PIB Orange Fertilizer
 - Combine objectives/use synergies



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From Problem to Business

从问题到商业



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