Alberta
AGRICULTURE, FOOD AND RURAL DEVELOPMENT

Western Forage/Beef Group

Feedlot Manure Management
育肥场粪便管理

Arvid Aasen

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Lacombe Research Centre

Lacombe, Alberta, Canada

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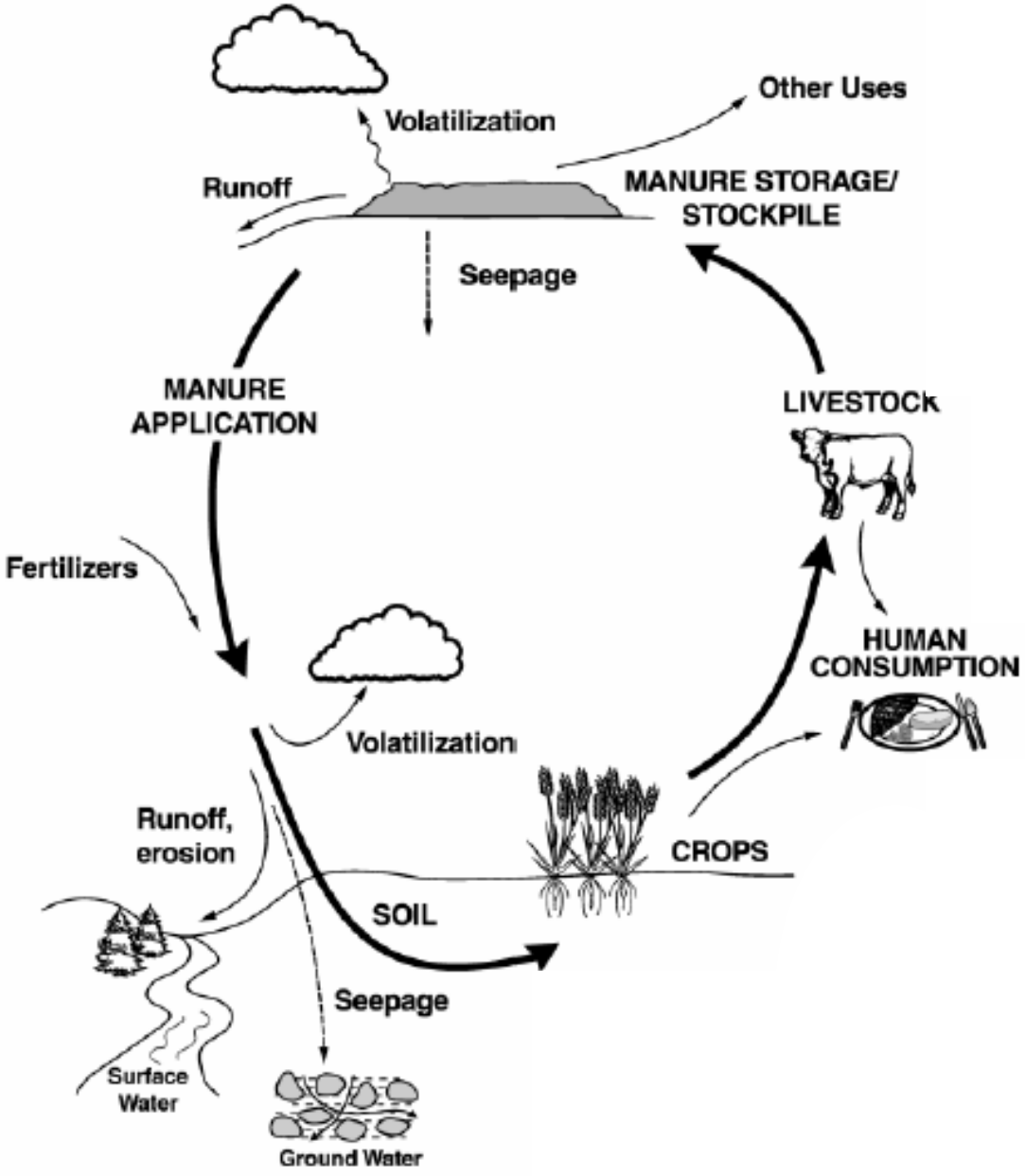
Figure 1. Role of Manure in Agricultural Production.



图表1：粪便在农业生产上的作用

Runoff from feedlot

育肥场排泄/流出

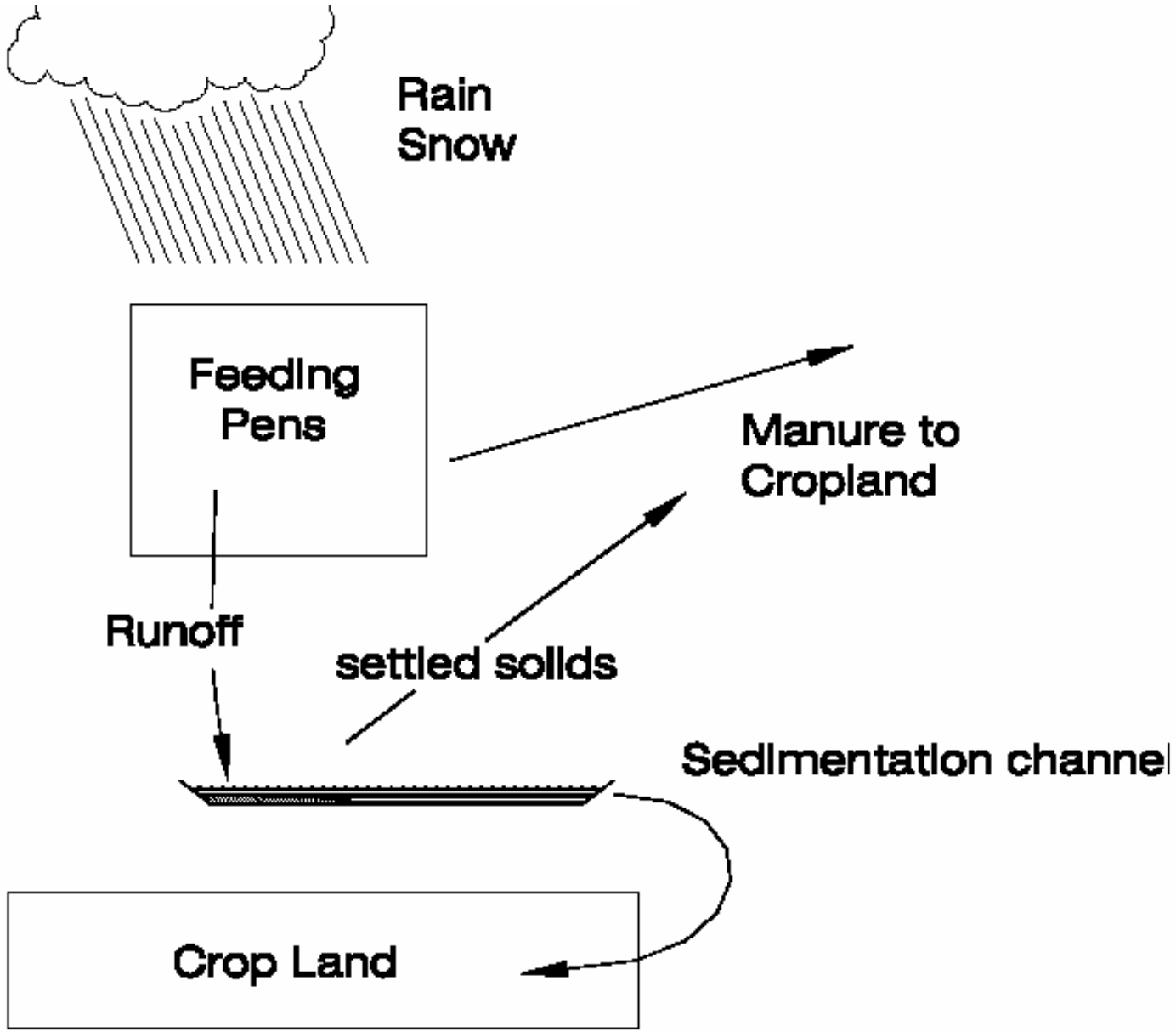


Figure 10. Runoff - Large Lots.

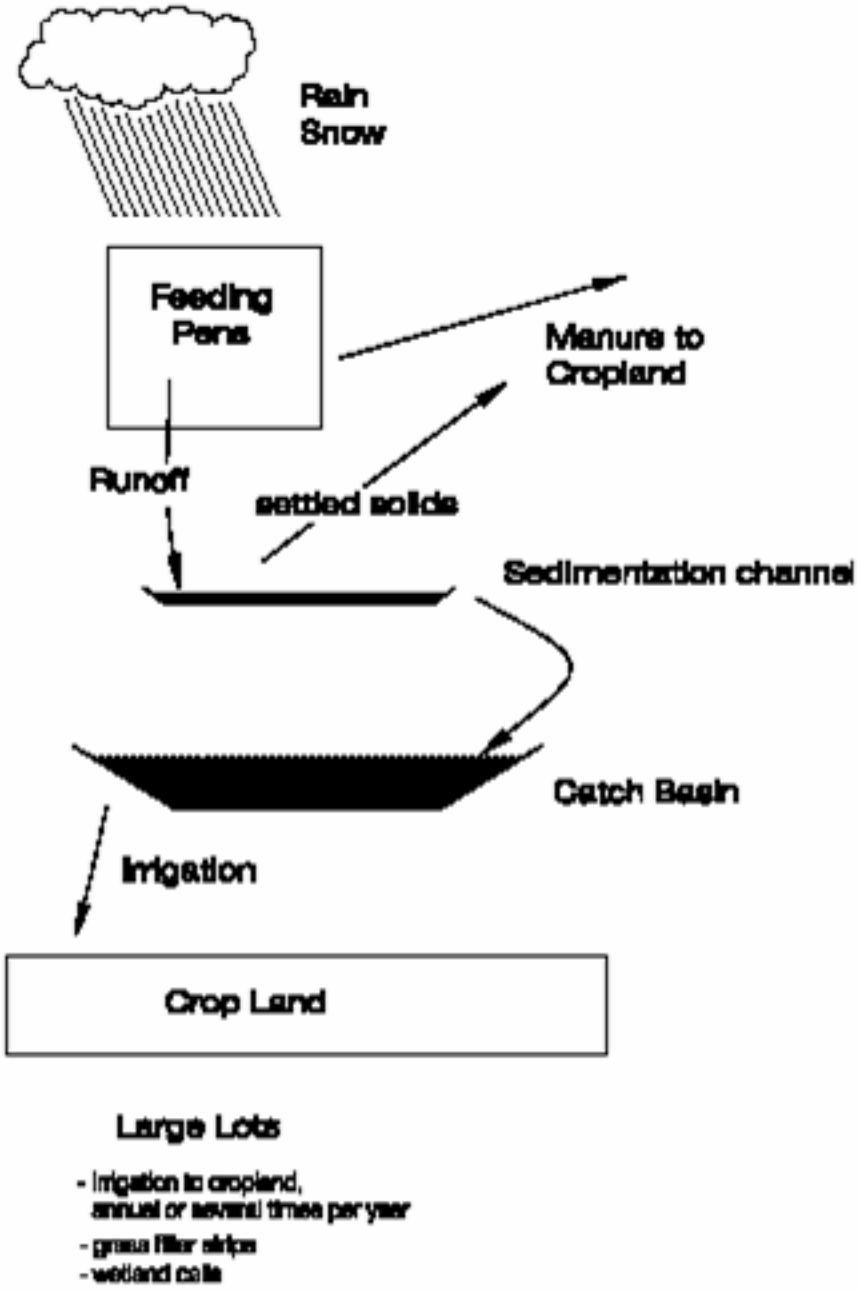
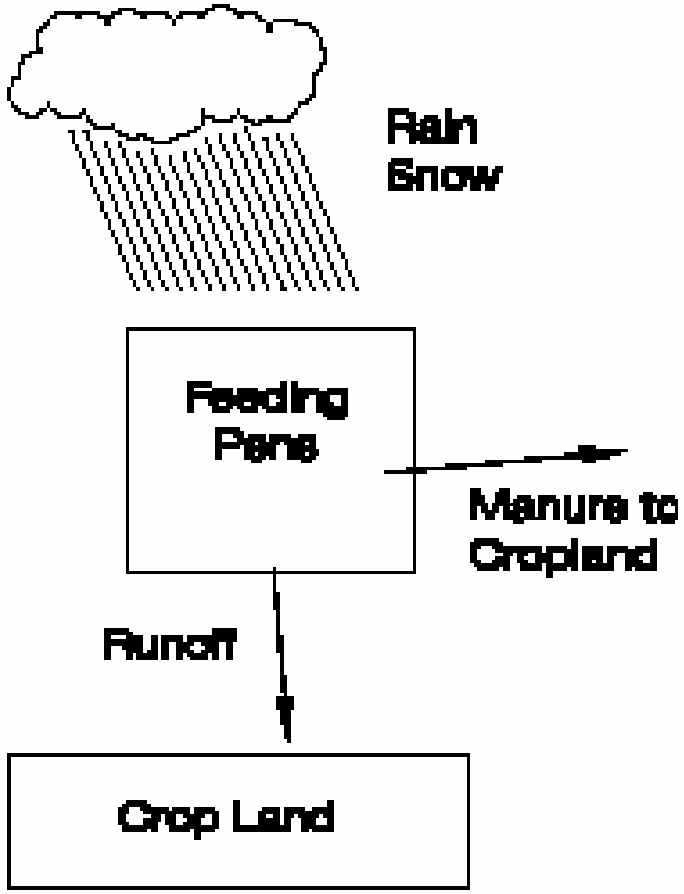
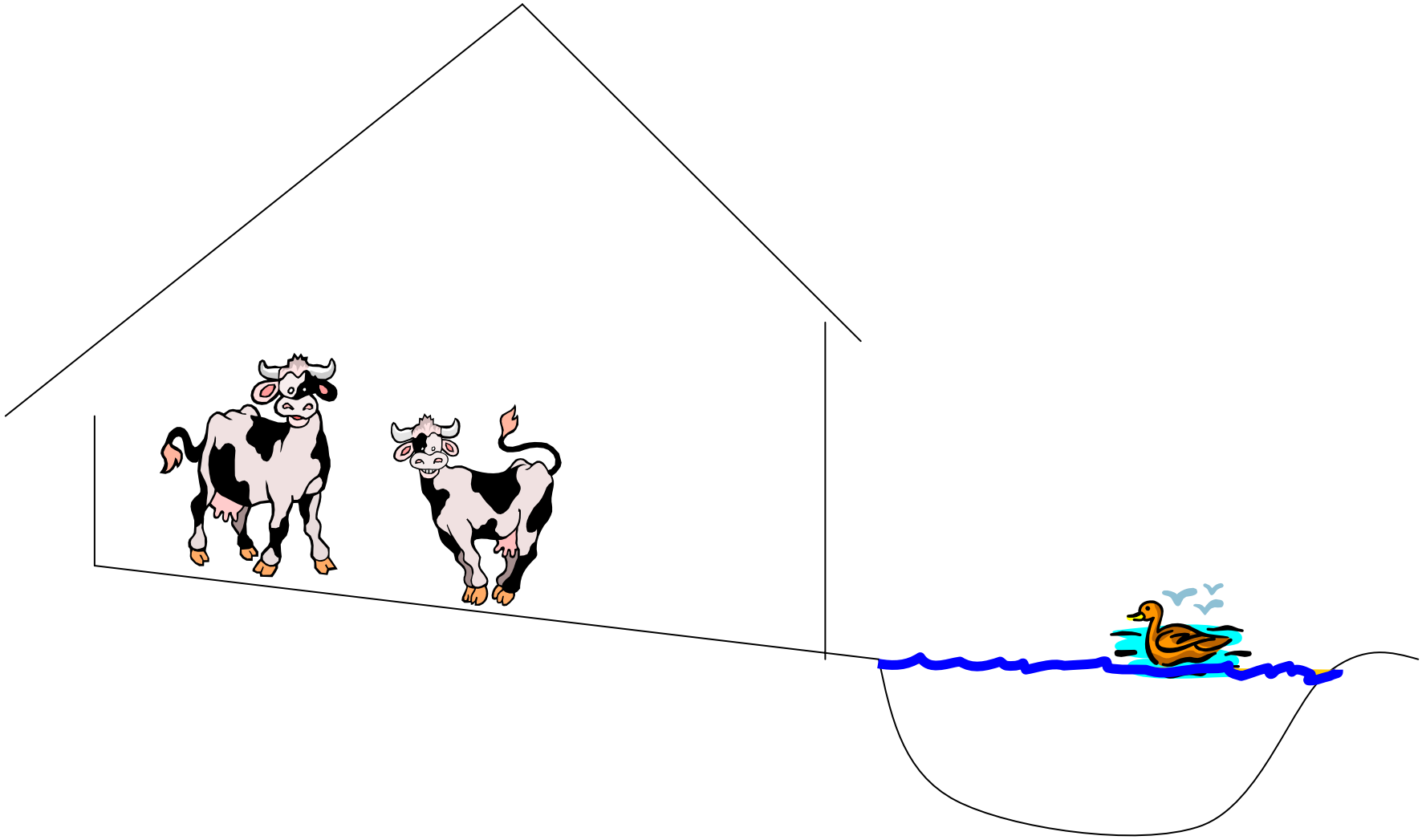
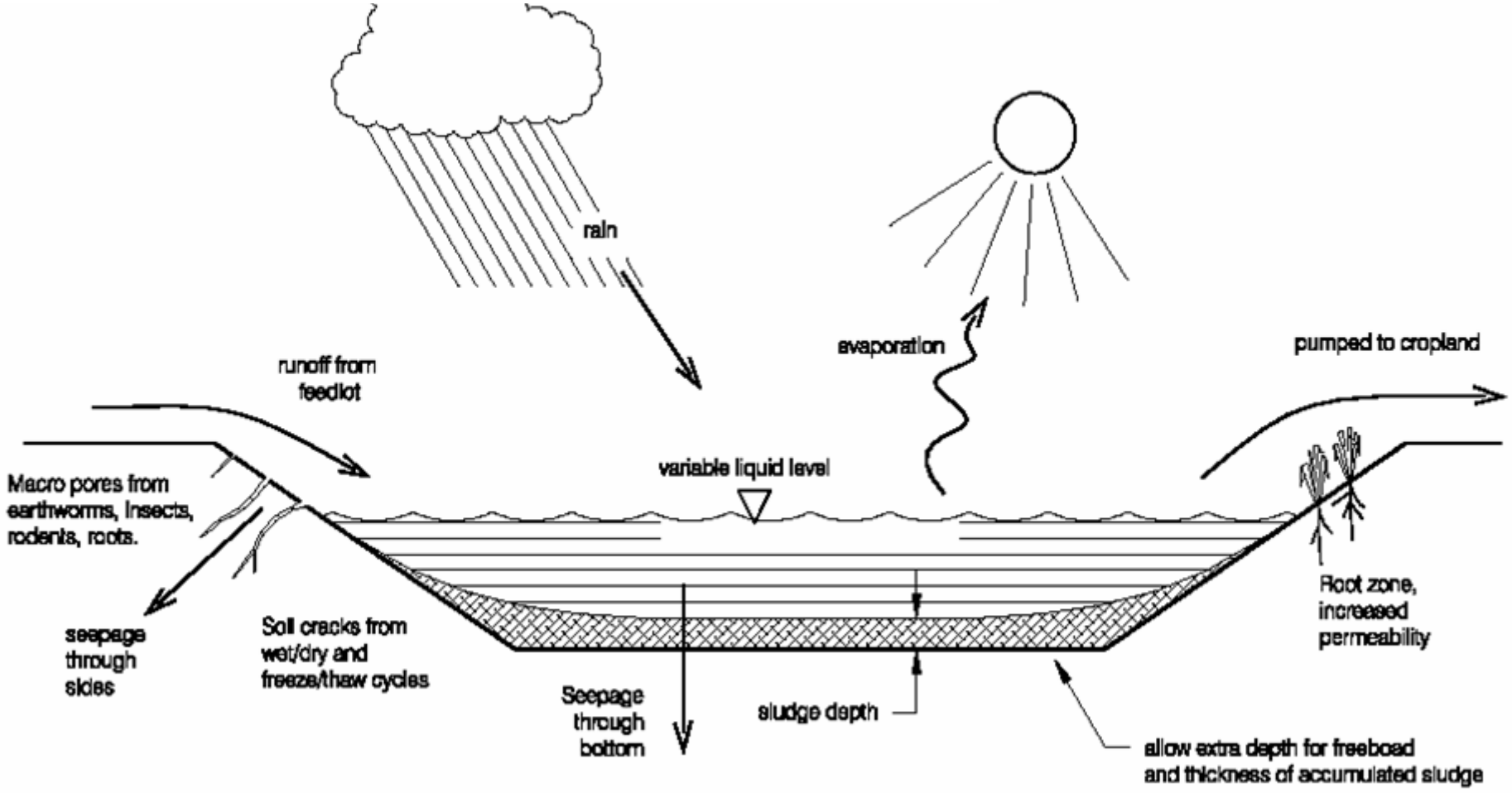


Figure 12. Runoff - Small Lots.





Seepage potential from catch basins
排污池的渗流潜力



Protecting Surface And Groundwater
保护地上和地下水

- Determine soil type, topography, and water table
- 确定土壤类型、地势和水位
- Contain runoff from feedlot, manure storage areas and silage pits
- 包括育肥场排泄、粪便贮存区和青贮窖
- Do not locate near surface water, streams or areas that flood
- 不要位于地表水、河流或洪水区
- Monitor nutrients used on crops
- 监测作物使用的营养

Manure Production粪便生产

	Weight 重量	Total Manure Production 总粪便生产		
	Kgs.公斤	Kg/day 公斤/天	tonne/yr 吨/年	Liters/day 升/天
Beef 肉牛	450	27	9.9	28.4
Dairy 乳牛	450	37	13.5	37.5
Calves 犊牛	100	5.5	2	5.7

Average Nutrient Content of Beef Manure
肉牛粪便的平均营养含量

	Moisture 水份	Total N全氮	Total N 全氮	Avail. N可利用氮	Total P全磷	Total K全钾
	%	%	Kg/t 公斤/吨	Kg/t 公斤/吨	Kg/t 公斤/吨	Kg/t 公斤/吨
Beef (wet) 肉牛（湿）	50	1.0	10	2.6	2.4	6.7
Beef (dry) 肉牛（干）	0	2.0	20	5.1	4.8	13.3

Manure Utilization粪便利用

- Manure is a valuable source of nutrients
- Feedlots produce a large quantity of manure
- Liquid manure and runoff must be collected
- Dry or composted and liquid manure can be used on crops
- Monitor amounts of nutrients applied to the crops to prevent build up

- 粪便是有价值的营养源
- 育肥场生产大量的粪便
- 液体粪便和排泄必须回收
- 干肥、堆肥和液体肥可用于作物
- 监测提供给作物的营养量以防止过剩

Composting of Manure堆制粪便

- Biological breakdown of the manure
- Manure in more stable format
- Improves manure handling by reducing weight and volume
- Reduces odors
- Much better soil conditioner and improves soil tilth

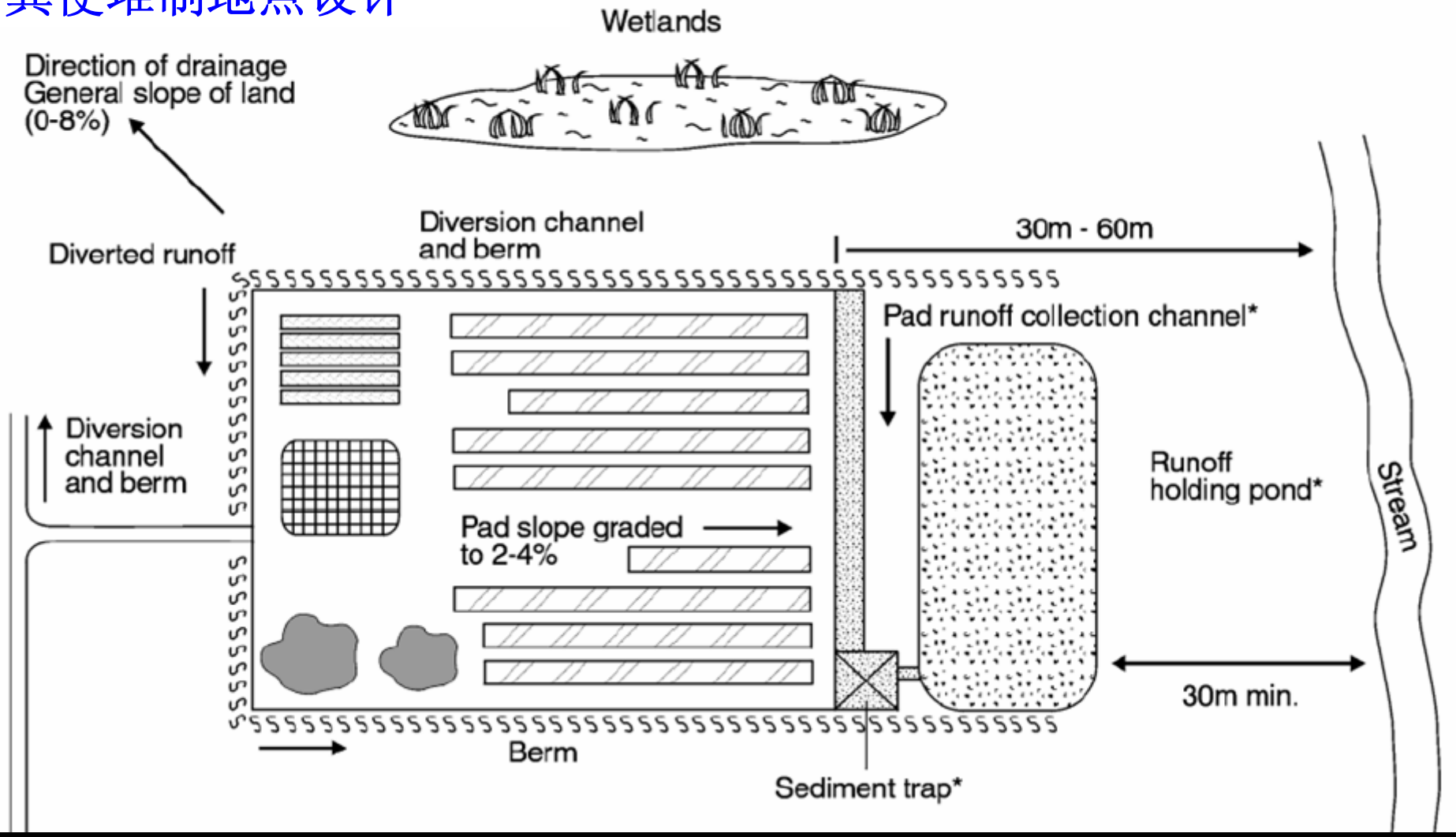
- 生物分解粪便
- 粪便处于较稳定的形式
- 通过降低重量和容积来处理粪便
- 减少气味
- 较好的土壤调节剂和改进土壤耕作

Manure Composting Site
粪便堆制地点

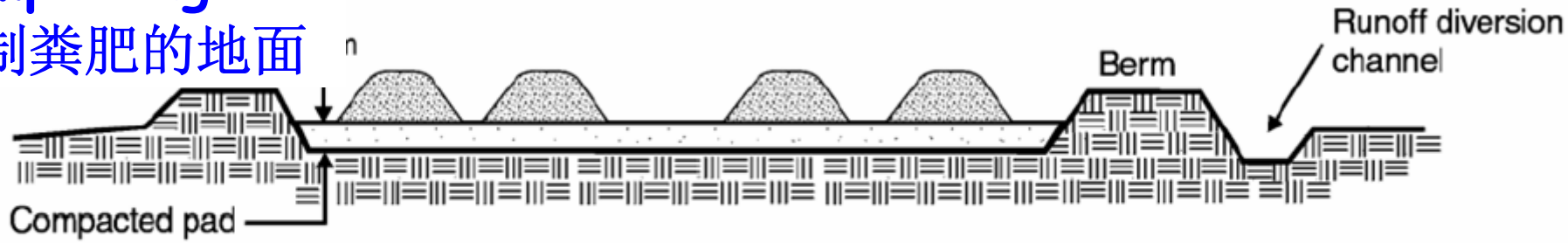
- Choose site which controls runoff into surface water
- Control of water to limit flooding the storage area
- Composting pad composed of clay or cement
- Monitor groundwater if water table high

- 选择可控制排泄进入地表水的地方
- 控制水泛溢贮藏区
- 堆制粪肥的地面由粘土或水泥构成
- 如果水位高监测地下水

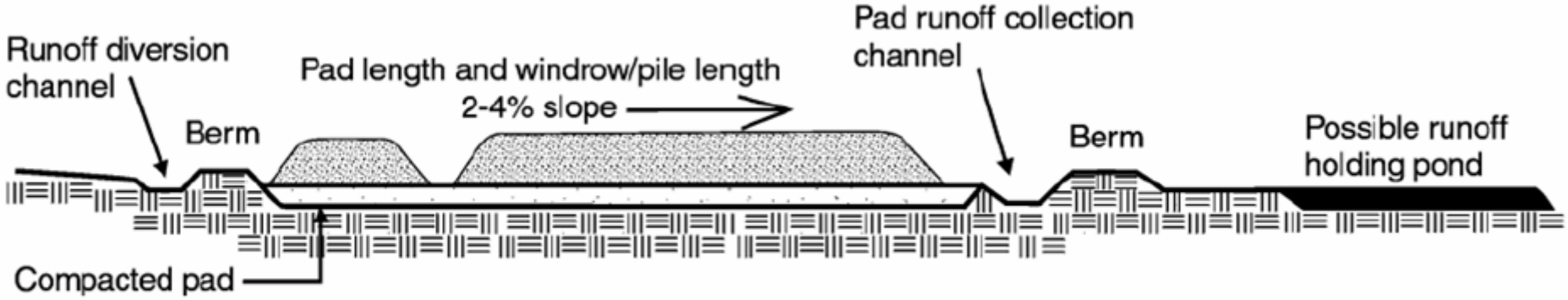
Composting site design
粪便堆制地点设计



Composting Pad
堆制粪肥的地面

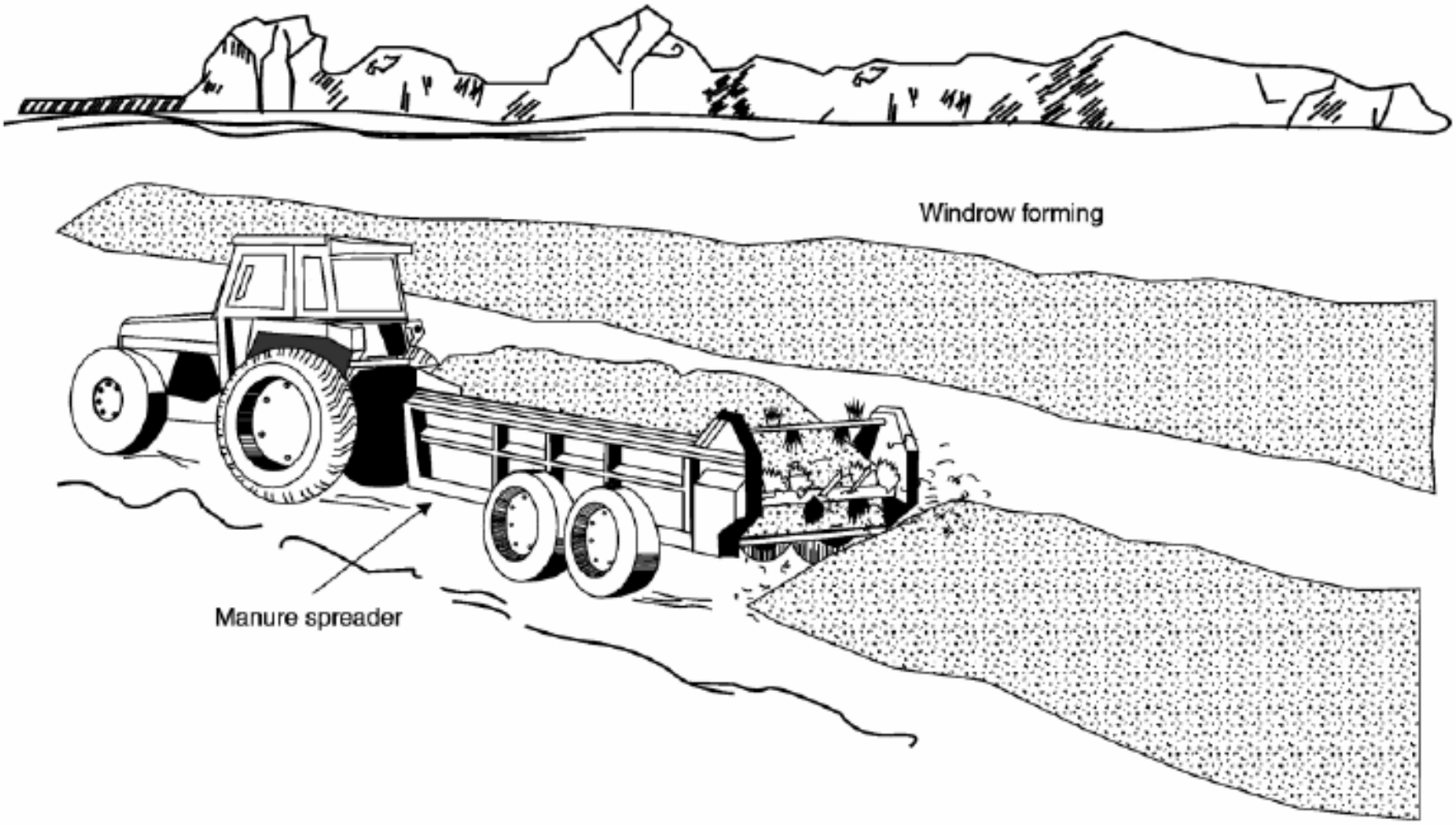


Cross Section横截面

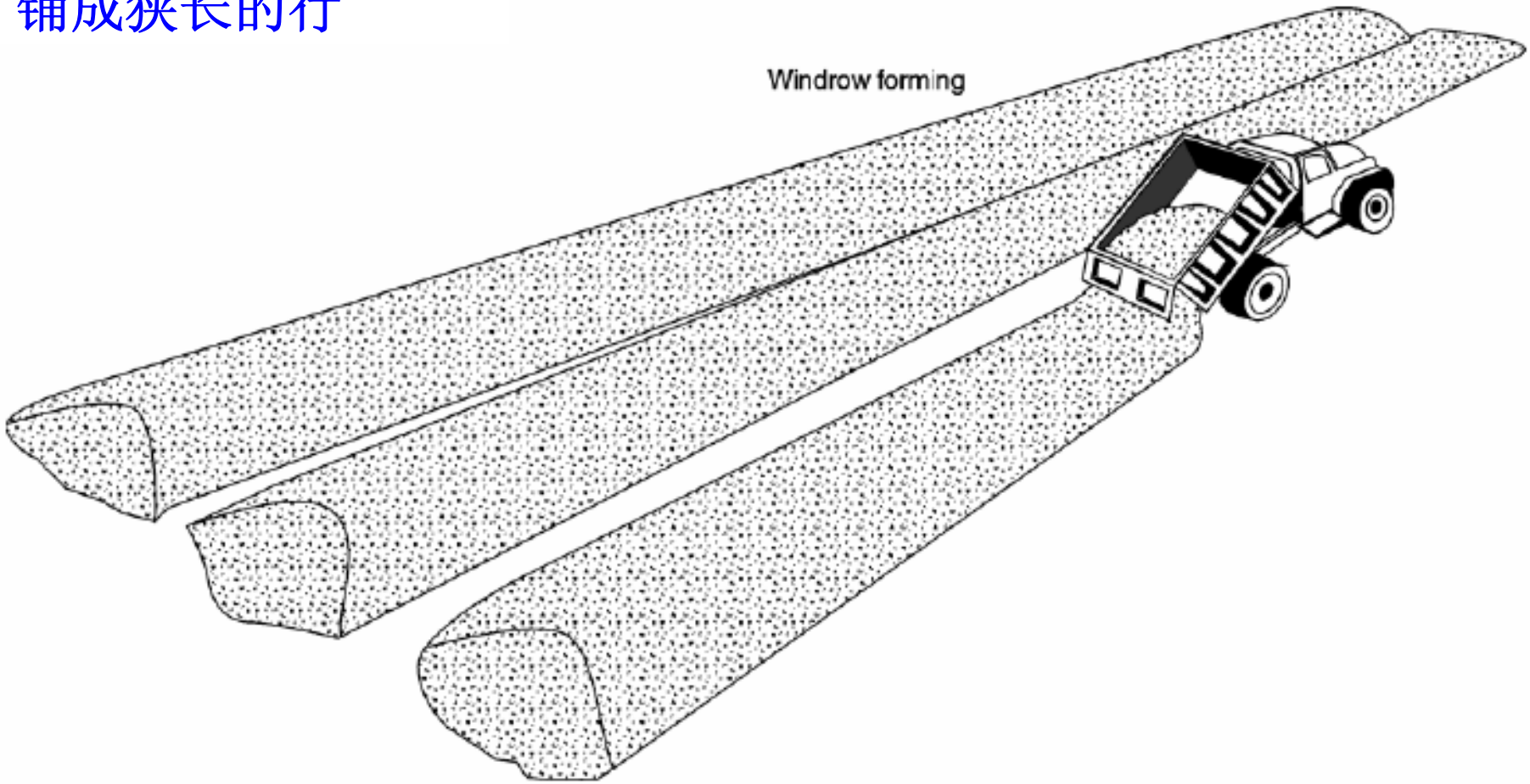


Length wise明白长度

Forming Windrows
堆成狭长的行



Forming Windrows
铺成狭长的行



Composting Process堆肥制作过程

- Carbon to Nitrogen Ratio 20:1 – 40:1
- 碳和氮比率20：1-40：1
  - Can go as low as 15:1可低到15：1
- Moisture content – 40% - 65% (50-60%)
- 水份含量-- – 40% - 65% (50-60%)
- Oxygen concentrations - >5% (5-15%)
- 氧浓度->5% (5-15%)
- pH – 6.5 – 8.0 pH值 – 6.5 – 8.0
- Compost pile temperature – 40°C-65°C (55°C-60°C)
- 堆积温度 – 40°C-65°C (55°C-60°C)
- Particle size – 0.25 – 1.5 cm
  - 颗粒大小： – 0.25 – 1.5 cm
  - (preferred range)（首选范围）

Composting Process 堆肥制作过程

- Microorganisms utilize oxygen to decompose organic materials (aerobic decomposition)
- 微生物利用氧气分解有机物质（需氧分解）
- Generates heat and releases water vapor, carbon dioxide, nitrous oxide and other gases
- 产生热并释放水蒸气、二氧化碳、一氧化二氮和其它气体

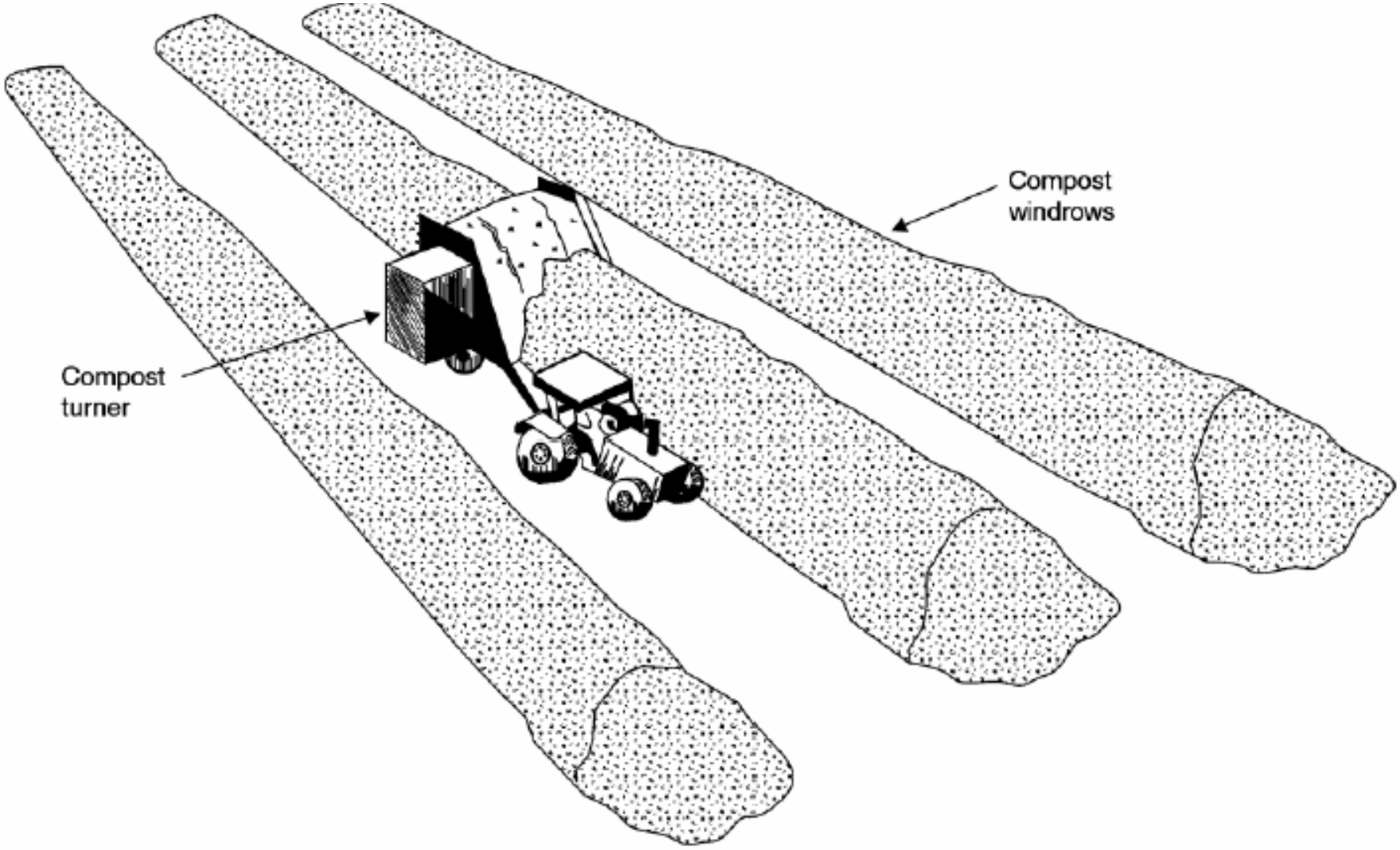
Composting Process 堆肥制作过程

- Heat produced is a good indicator of composting process
- Temperature rises rapidly when decomposition is active
- Temperature drop indicates a shortage of oxygen and requires turning
- Temperature should be 40°C-65°C
-
- 热的产生是堆肥制作过程一个好的指示物
- 当分解活跃时温度上升快
- 温度下降表示缺氧需要翻动粪堆
- 温度应为 40°C-65°C

Composting Process 堆肥制作过程

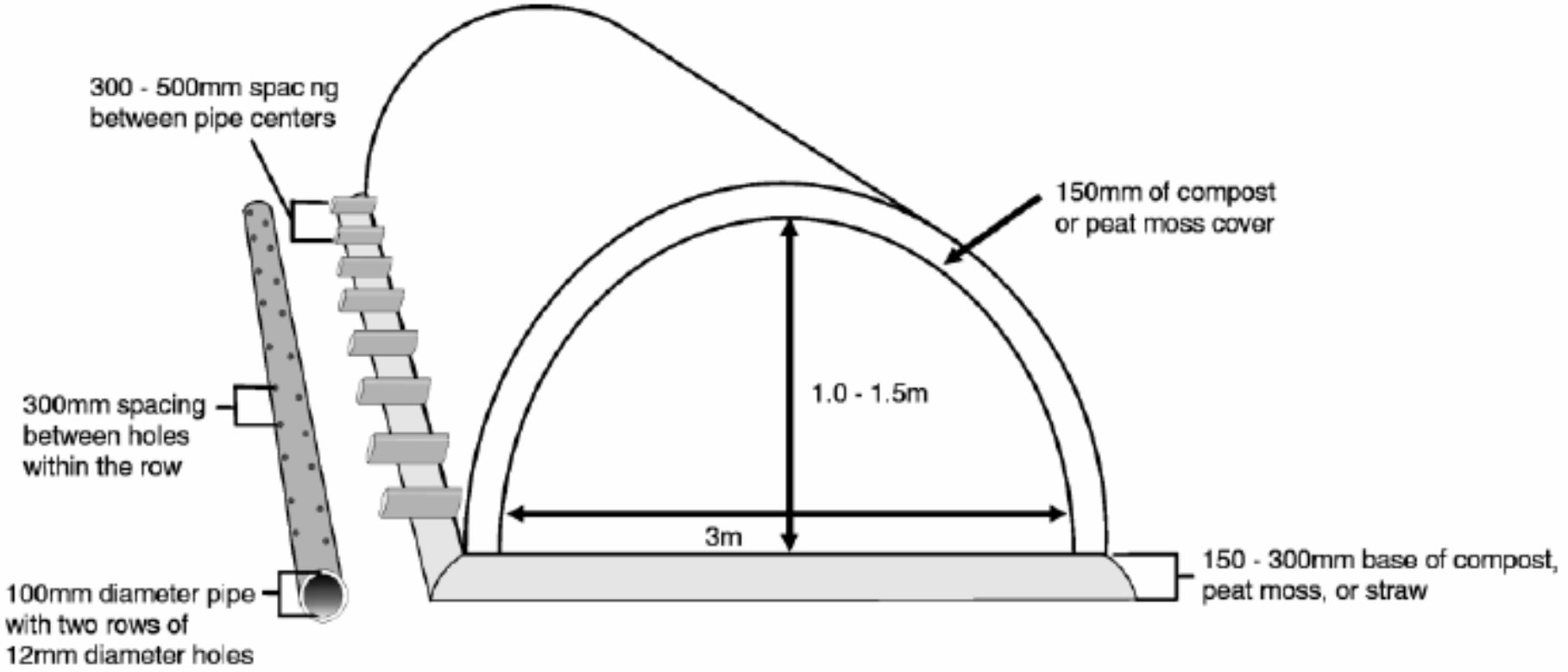
- Oxygen can be added by aeration
- 可通风加氧
  - Active or passive主动或被动
- Active - mechanical turning
- Passive - uses air systems to supply aeration
- 主动-机械翻动
- 被动—使用空气系统提供通风

Turning Windrows
翻动粪行




EarthSaver
EarthSaver
EarthSaver

Static Pile – Passive aeration
静态堆—被动通风



Passive Aeration被动通风

- Generally not as effective as active aeration
- Takes longer than active aeration
- Must ensure that sufficient air is getting into pile
- Needs less labor than active aeration

- 通常不如主动通风有效
- 时间比主动通风长
- 必须保证充足的空气进入粪堆
- 比主动通风省劳力

Uses of Compost使用堆肥

- The best use is as a nutrient source for growing crops
- It is also valuable as a soil conditioner
- Composting reduces mass and volume making it easier to transport to the fields

- 作为生长作物的最好营养源使用
- 作为土壤的调节剂也是有价值的
- 制成堆肥减少数量和体积容易运到田间

Feedlot Manure Composting in Alberta[1]
阿尔伯特育肥场粪便制成堆肥

- Turned the manure pile 3 times - manure pile made in April, turned in June, July, August and spread in September
- Reduced the initial manure pile to 35% of the original weight.
- Volume was reduced by about 50%.
- Moisture content of the compost pile was reduced to 23% from 69%.
- Compost pile reached the temperatures high enough to disable weed seeds and pathogens.
- odor when spreading appeared insignificant

- 翻动粪堆3次--4月堆积，6、7、8月翻动，9月展开
- 粪堆减少最初重量的35%
- 体积减少50%
- 水份含量从69%减少到23%
- 堆肥的堆达到的温度足以使杂草籽和病原体丧失能力
- 摊开时味道以无关紧要

[1] Kevin Yaremchuk – Alberta Agriculture