

PRRSV: 预防和控制的风险因素、知识差距和管理策略

李曼中国养猪会议

2023年10月20日至22日

Science-driven solutions®



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

猪繁殖与呼吸综合征

- 简史
- 1987年：
 - 神秘的猪病
- 病毒分离：
 - 1991年：荷兰（Lelystad病毒）
 - 1992年：美国（猪不孕不育和繁殖综合征病毒，ATTC VR 2332）
- 经济损失
 - 每年6.64亿美元¹



1. Holtkamp DJ, Kliebenstein JB, Neumann EJ, et al. Assessment of the economic impact of porcine reproductive and respiratory syndrome virus on United States pork producers. *J Swine Health Prod.* 2013



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

PRRSV分离31年以来

- 1997
 - Wills、Zimmerman等人
 - 通过直接、密切或间接接触传播PRRSV²
- 2009
 - Dee等人
 - 猪繁殖与呼吸综合征病毒和猪肺炎支原体的远距离空气传播证据³

Science-driven solutions®

2. Wills RW, Zimmerman JJ, Swenson SL, et al. Transmission of PRRSV by direct, close, or indirect contact. *J Swine Health Prod* 1997;5(6):213-218.

3. Dee, Scott et al. "Evidence of long distance airborne transport of porcine reproductive and respiratory syndrome virus and *Mycoplasma hyopneumoniae*." *Veterinary research* vol. 40,4 (2009)



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

PRRSV分离31年以来

- 2002
 - Dee等人
 - 机械传动⁴



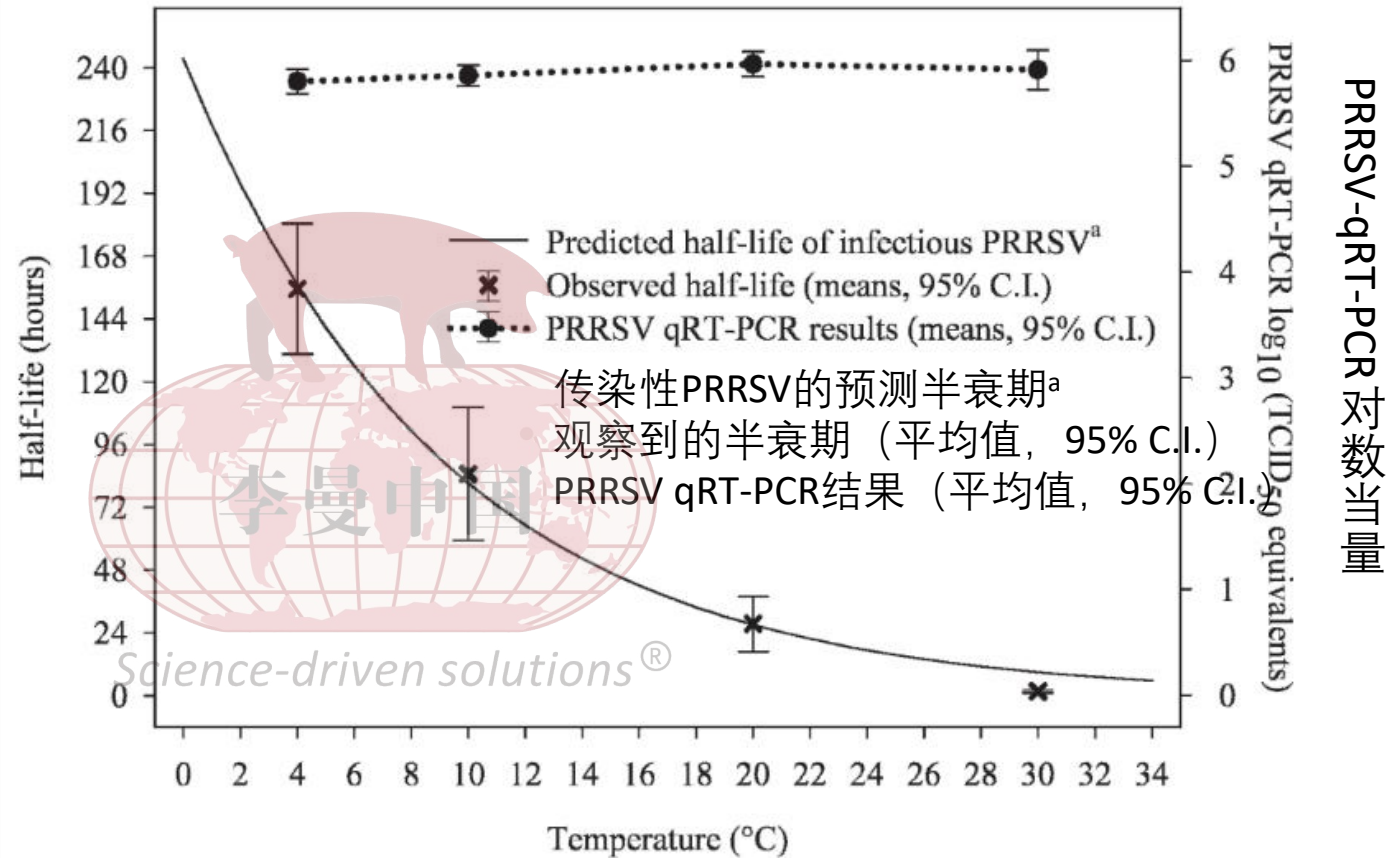
4. Dee S, Deen J, Rossow K, Wiese C, Otake S, Joo HS, Pijoan C. Mechanical transmission of porcine reproductive and respiratory syndrome virus throughout a coordinated sequence of events during cold weather. Can J Vet Res. 2002



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

PRRSV分离31年以来

- 2010
- Jacobs等人
 - 病毒稳定性⁵



5. Jacobs AC, Hermann JR, Muñoz-Zanzi C, et al. Stability of Porcine Reproductive and Respiratory Syndrome virus at Ambient Temperatures. *Journal of Veterinary Diagnostic Investigation*. 2010



空气采样检测PRRSV

- Brito, Dee等人, 2014⁵
 - 4个PRRSV阴性母猪养殖场外的空气收集
 - 四个地点-美国中西部
 - 60天, 2012年10月15日至12月15日



5. Brito B, Dee S, Wayne S, Alvarez J, Perez A. Genetic diversity of PRRS virus collected from air samples in four different regions of concentrated swine production during a high incidence season. Viruses. 2014

1. Dee S, Orskov S, Oliveira S, Deen J. 2009 Evidence of long distance airborne transport of porcine reproductive and respiratory syndrome virus and *Mycoplasma hyopneumoniae*. Vet. Res. 40 (4) 39.



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

Brito等人从空气样本中检测PRRSV⁶

- 四个样本位置
 - 60个收集日
 - 240个空气样本
- 10km范围内的相邻农场数量
 - 20至99
- 邻近农场到采集点的平均距离(km)
 - 6.19至7.53公里
- PRRSV PCR阳性频率
 - 总体37%
 - 29%至42%（按地点）
- 阳性样本中的平均活病毒log₁₀ TCID₅₀/mL
 - 3.8到5.3



5. Brito B, Dee S, Wayne S, Alvarez J, Perez A. Genetic diversity of PRRS virus collected from air samples in four different regions of concentrated swine production during a high incidence season. Viruses. 2014



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

空气采样检测PRRSV

- Tousignant, 2015⁷
- 241个空气样本，482小时的采集时间
 - 2013年10月1日至3月30日
 - 猪舍逆风10m
- 通过PCR，空气样本PRRSV为阴性



7. Tousignant, Steven. (2015) Epidemiology of PRRS virus in the United States: Monitoring, Detection in Aerosols, and Risk Factors. Retrieved from the University of Minnesota Digital Conservancy, <https://hdl.handle.net/11299/175353>



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

空气采样检测PRRSV³

- 猪舍内空气收集
 - 确认PRRSV阳性
 - 30/30血清PRRSV PCR阳性
 - 2/2口腔液PRRSV PCR阳性
 - 29/98（29.6%）空气样本PRRSV PCR在16天内呈阳性
- 后续保育填充
 - 诊断和临床描述与之前描述相似
 - 空气收集距离PRRSV阳性猪舍5、10、20米
 - 0/24 PRRSV PCR阳性

7. Tousignant, Steven. (2015) Epidemiology of PRRS virus in the United States: Monitoring, Detection in Aerosols, and Risk Factors. Retrieved from the University of Minnesota Digital Conservancy, <https://hdl.handle.net/11299/175353>



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

各种PRRSV毒株的存活率（天）

PRRSV strain ^a	4°C	25°C	37°C
	Days of survival (Percent reduction)	Days of survival (Percent reduction)	Days of survival (Percent reduction)
1-8-4	35 (97.81%)	7 (99.97%)	3 (99.53%)
1-4-4 MN	35 (99.12%)	7 (99.87%)	3 (98.87%)
1-4-4 SD	35 (99.98%)	3 (99.00%)	3 (99.94%)
Lelystad	35 (98.71%)	3 (99.99%)	3 (99.99%)
VR2332	35 (99.71%)	3 (99.99%)	1 (99.99%)
1-4-2	35 (99.39%)	1 (99.96%)	1 (99.99%)
1-26-2	35 (99.99%)	1 (99.99%)	1 (99.99%)
ATP Vaccine	35 (99.99%)	1 (99.99%)	1 (99.99%)
2-5-2	35 (99.97%)	1 (99.99%)	1 (99.99%)
1-7-4	35 (98.71%)	1 (99.78%)	1 (99.98%)

a: All strains belong to PRRSV-2 except the Lelystad strain, which belongs to PRRSV-1.

除了Lelystad毒株属于PRRSV-1外，所有其他毒株都属于PRRSV-2

University of Minnesota Swine Disease Eradication Center. SDEC Partners Research
Update, Volume 11, Issue 3 (2022)



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

相对风险分配的困难

- “在家禽业密集的地区，无论是从每个地点的鸟类数量还是从地点的总数来看，传播机制都可能被多种可能的途径所掩盖。”

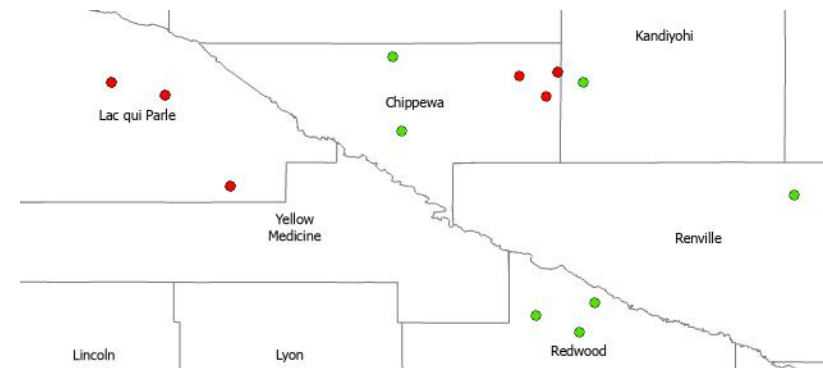
Science-driven solutions®

Hugh-Jones M, Allan WH, Dark FA, Harper GJ. The evidence for the airborne spread of Newcastle disease. J Hyg (Lond). 1973.



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

托布勒第一地理定律



Schwartz, unpublished

李曼中国

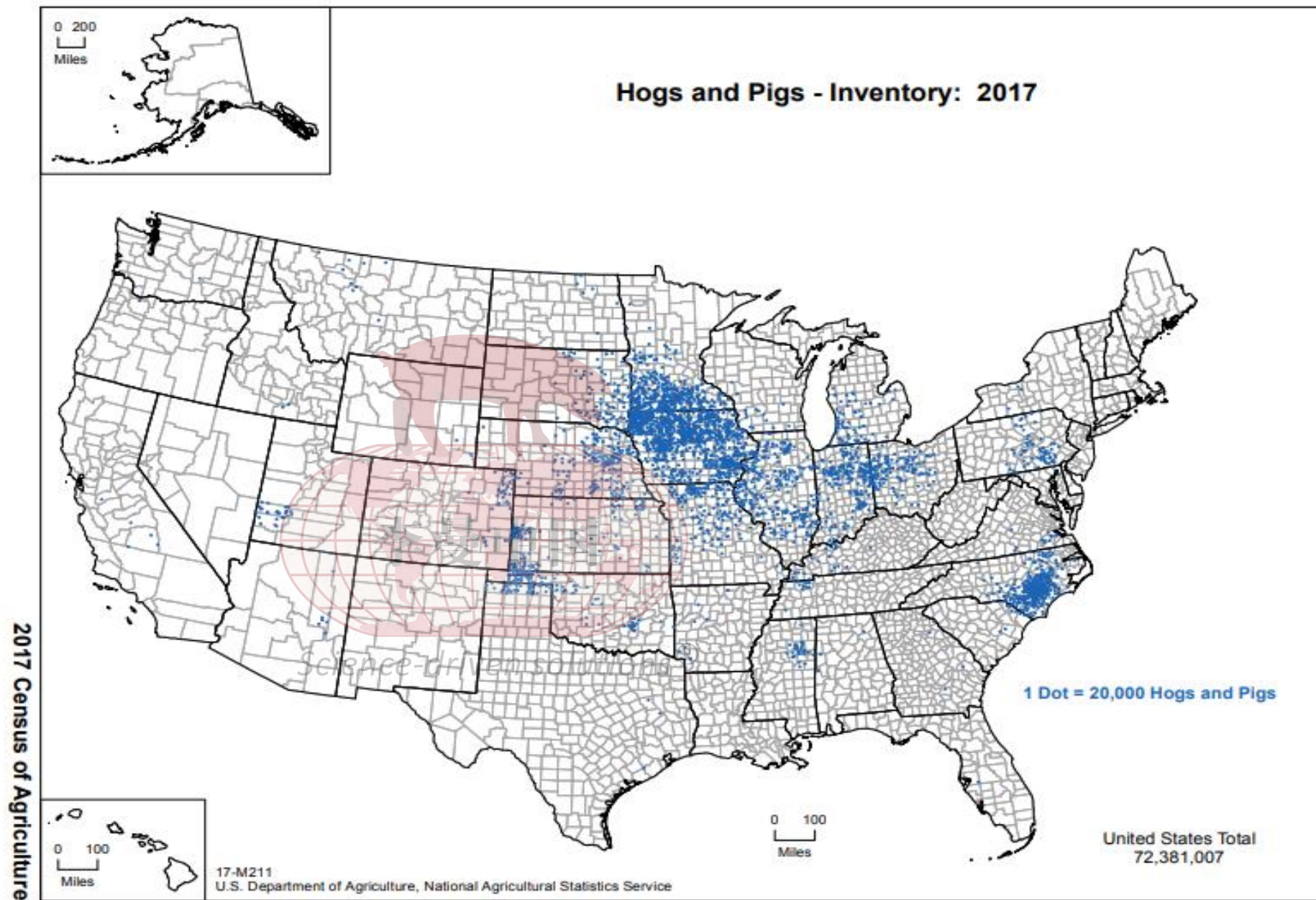
一切都与其他一切有关。但是，近处的事物比远处的事物更有关联性
-Waldo Tobler

Science-driven solutions®



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

美国生猪生产-
2017年美国农业
部, 农业普查
查

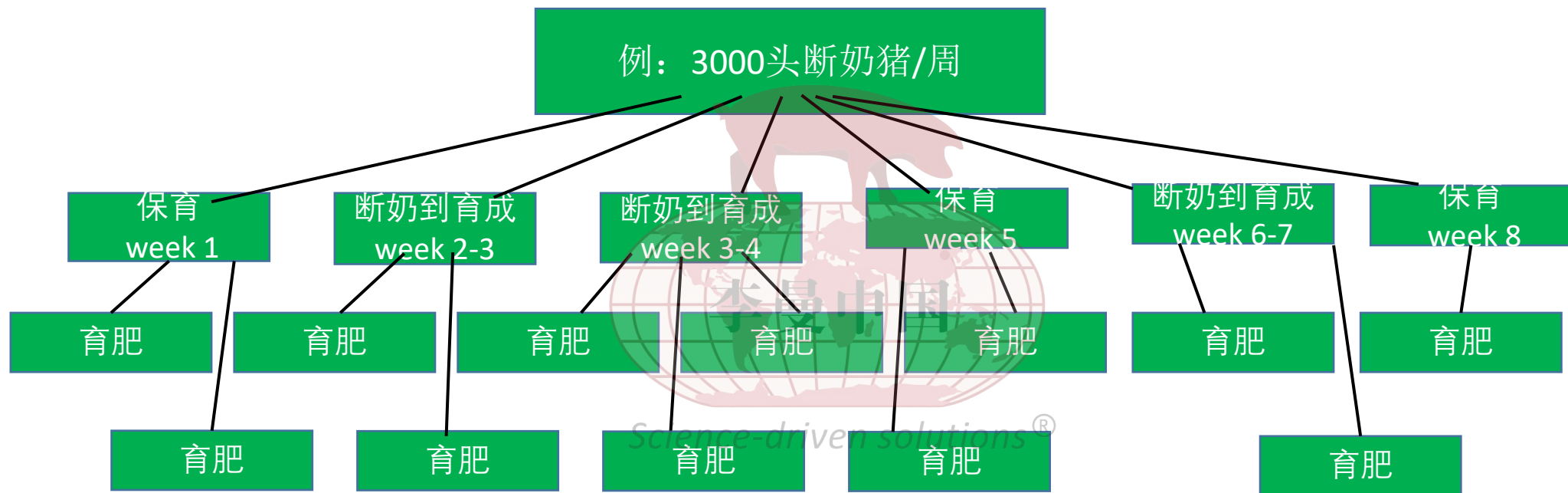


UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

多点生产模型

养殖场断奶

例：3000头断奶猪/周



特点：

1. 每周从繁殖断奶猪场到保育/育成猪舍运输
2. 从保育/育成猪舍到育肥舍的运输
3. 依赖系统的保育/育成猪舍场地容量（2400-8000）
4. 每个繁殖断奶猪场有12到20个保育/育成/育肥位点



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

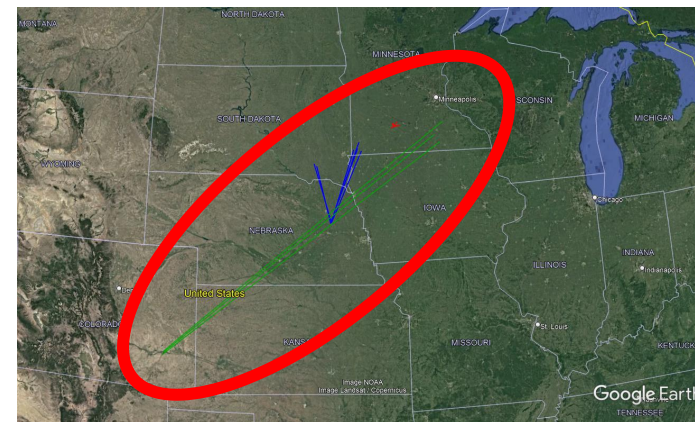
多点生产的猪流移动示例



断奶的猪从养殖场运到断奶农场1.5到40英里



断奶猪从繁殖场运往断奶农场100-250英里



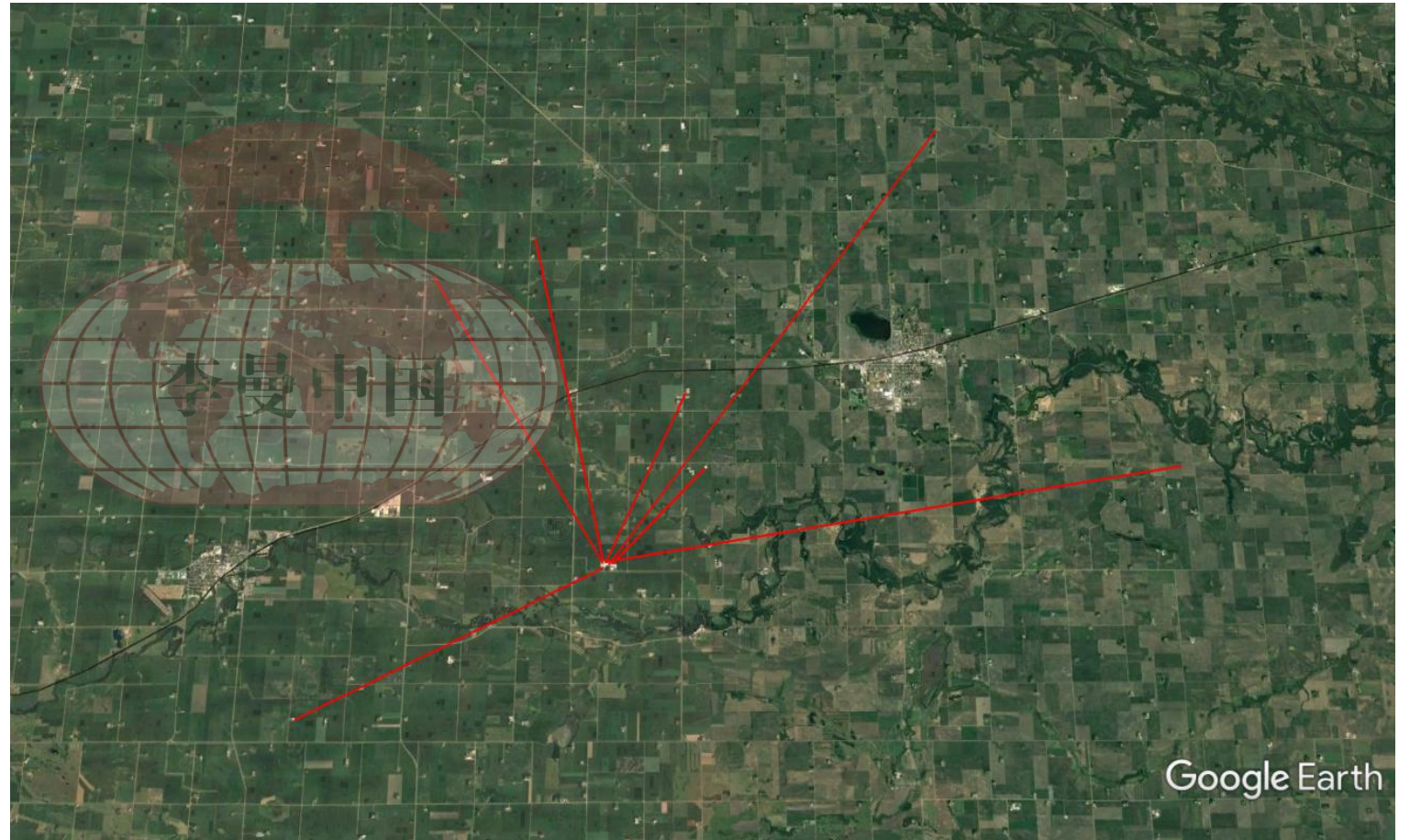
断奶猪从繁殖场运往断奶农场700-900英里



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

多点养猪，实例1

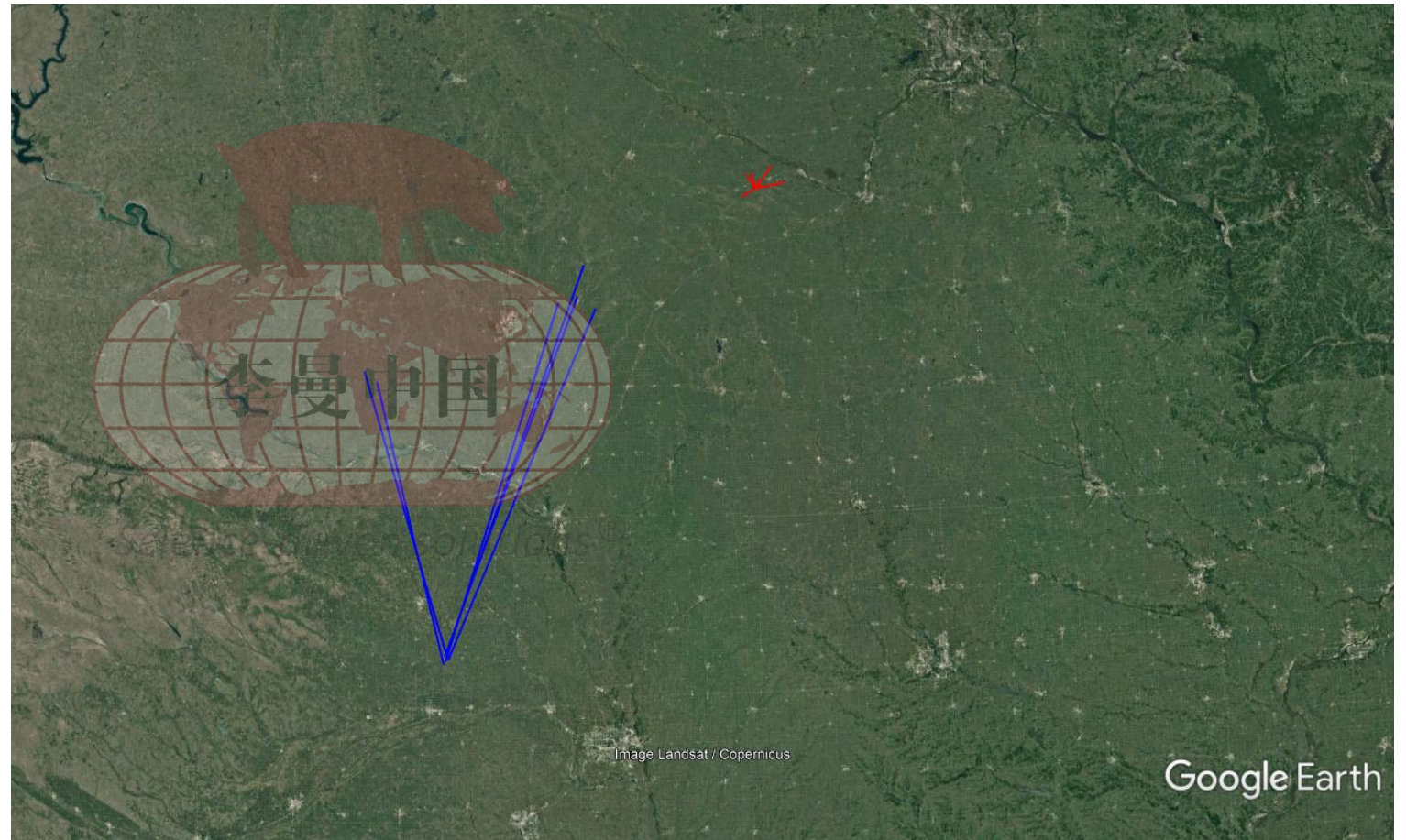
断奶猪从养殖场
运至断奶农场4至
50公里



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

多点养猪，实例2

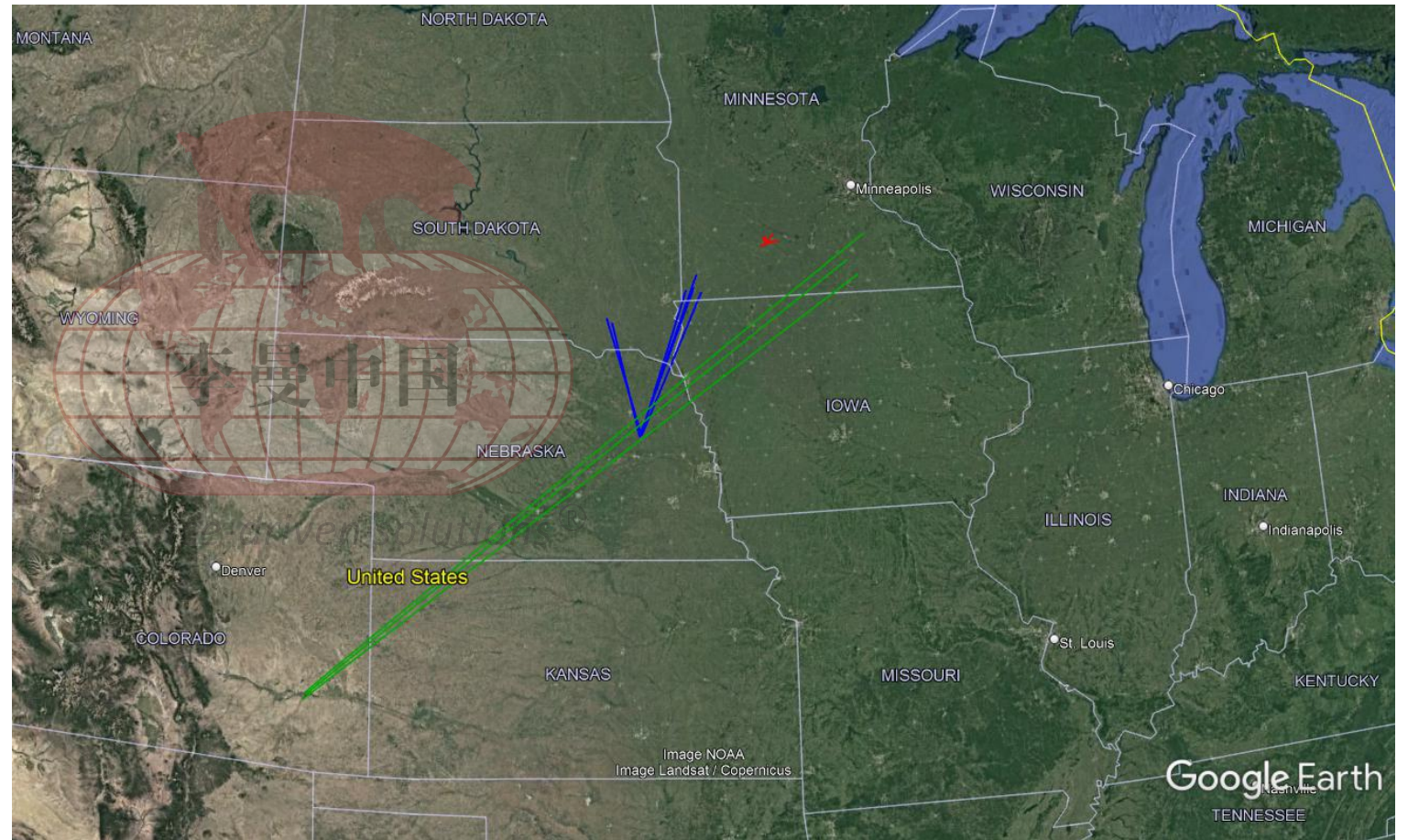
断奶猪从养殖场
运到断奶农场
250-500公里



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

多点养猪

断奶猪从繁殖场
运输到断奶农场
1500-2000公里



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

以上内容仅为本文档的试下载部分，为可阅读页数的一半内容。如要下载或阅读全文，请访问：<https://d.book118.com/828032054074007044>