

Reproduction Management and How Data Helps Manage This Area of Your Dairy

繁殖管理及奶牛数据应用



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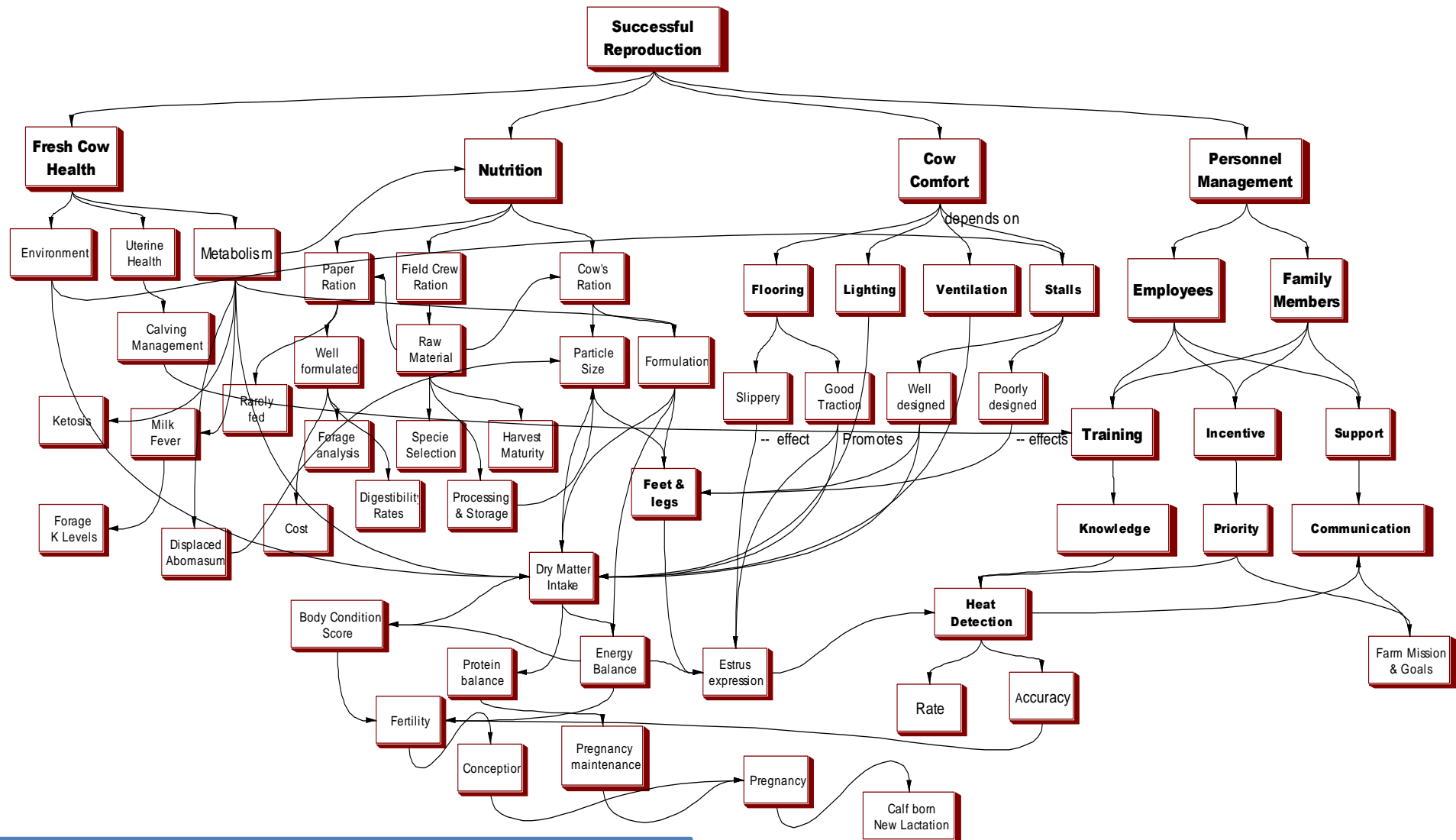
CRI Int'l Technical Services Manager

What Impacts Reproduction? 什么影响繁殖？



Wide Angle View of Reproduction

非常多的因素影响繁殖







What Impacts Reproduction? 什么影响繁殖？



Transition Period 围产期

- This is known as the dry period through freshening up to breeding
围产期是指奶牛干奶到产犊后配种这一阶段
- What can we look at to evaluate the transition period on a dairy?
牧场在围产期应该评估哪些指标？



Transition Period 围产期

- Clinical diseases we can evaluate on a dairy
我们可以评估牧场的临床疾病
 - Milk Fever(hypo-calcemia) <5% 产乳热
 - DA (displaced abomasom) <6% 真胃变位
 - Retained Placenta <5-15% 胎衣不下
 - Metritis <10-15% 子宫炎
 - Ketosis <15-20% 酮病



Transition Period 围产期

| Event | Total | <31 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | >330 |
|---------|-------|------|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| FRESH | 3388 | 3388 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SOLD | 924 | 111 | 105 | 85 | 71 | 77 | 48 | 65 | 66 | 66 | 61 | 44 | 125 |
| DIED | 96 | 42 | 8 | 2 | 3 | 5 | 6 | 1 | 4 | 3 | 4 | 2 | 16 |
| DA | 125 | 122 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| KETOSIS | 259 | 257 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| MF | 94 | 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| RP | 210 | 210 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTALS | 5096 | 4223 | 114 | 88 | 74 | 83 | 54 | 66 | 70 | 69 | 66 | 47 | 142 |

To calculate these percentages always use the number fresh. Example:

Ketosis $259/3388=7.6\%$ incidence of ketosis

计算疾病发病率时，要使用新产牛数量作为分母，例如，酮病发病率为 $259/3388=7.6\%$

To calculate culling add sold and died together and then divide by the number fresh. Fresh cow culling only use the cows sold or died in the first 60DIM. Example: $266/3388=7.8\%$ culled in first 60 DIM

计算淘汰率，把出售和死亡的数相加再除以新产牛数量。新产牛淘汰率只计算产后60天内死亡和出售的牛，例如，产后60天淘汰率是 $266/3388=7.8\%$



Transition Period 围产期

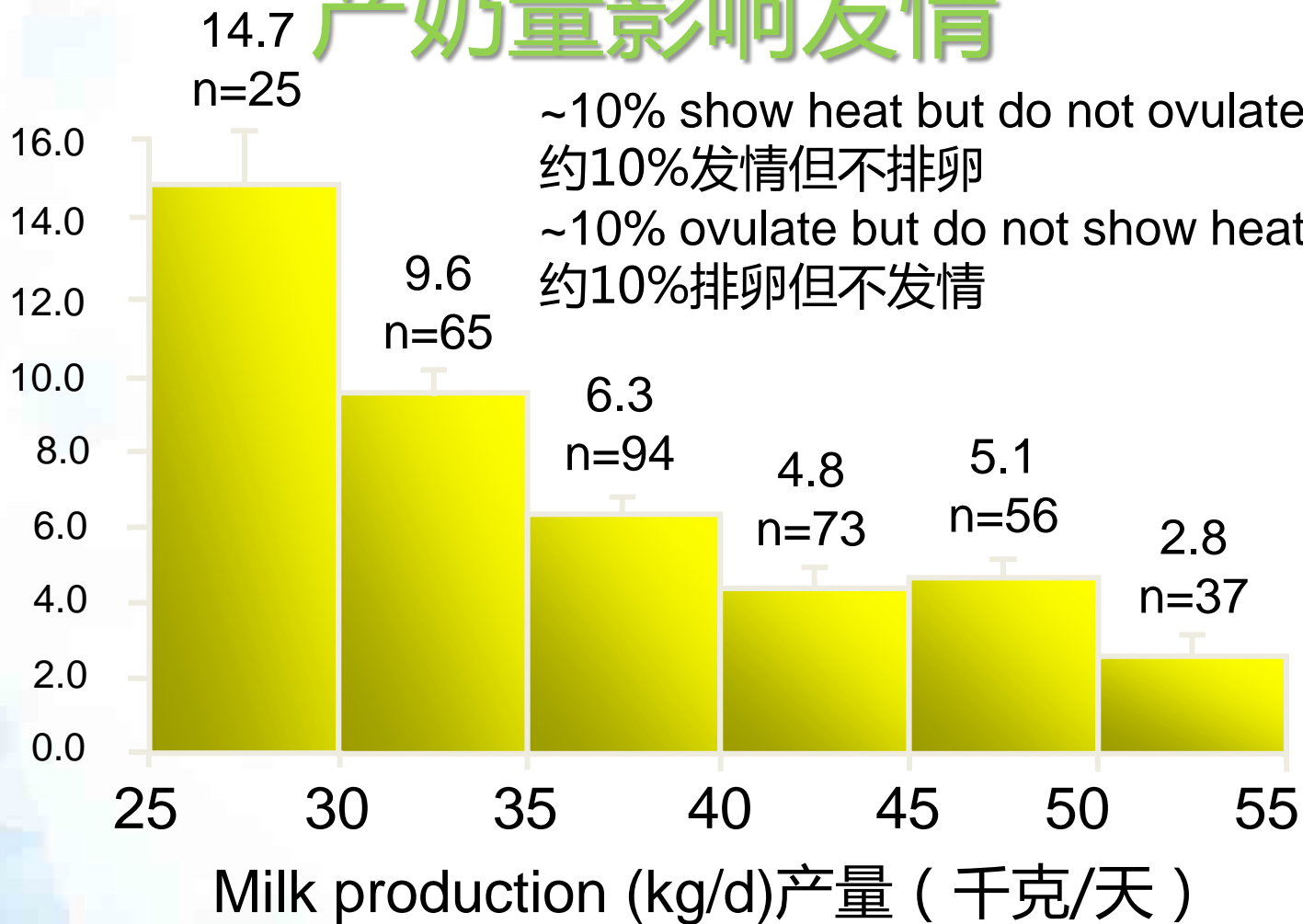
- Other Factors 其他因素
- Stocking Density in dry, prefresh and fresh pens
干奶圈、临产圈、新产圈的存栏密度
- Ideally we would have an 80% stocking rate
理想情况是80%的存栏率
- Cows should plenty of access to feed and water
奶牛应该能很轻松的采食饲料和水
- If possible keep heifers and cows in separate groups
如果条件允许，把头胎牛和经产牛分群饲养



Milk Production Effects Estrus

产奶量影响发情

Duration of estrus (h)发情持续时间



- Analysis included all single ovulations (n=350) except first postpartum ovulations
- Average milk production during the 10 days before estrus
- Lopez et al., 2004; Anim. Reprod. Sci. 81:209-223



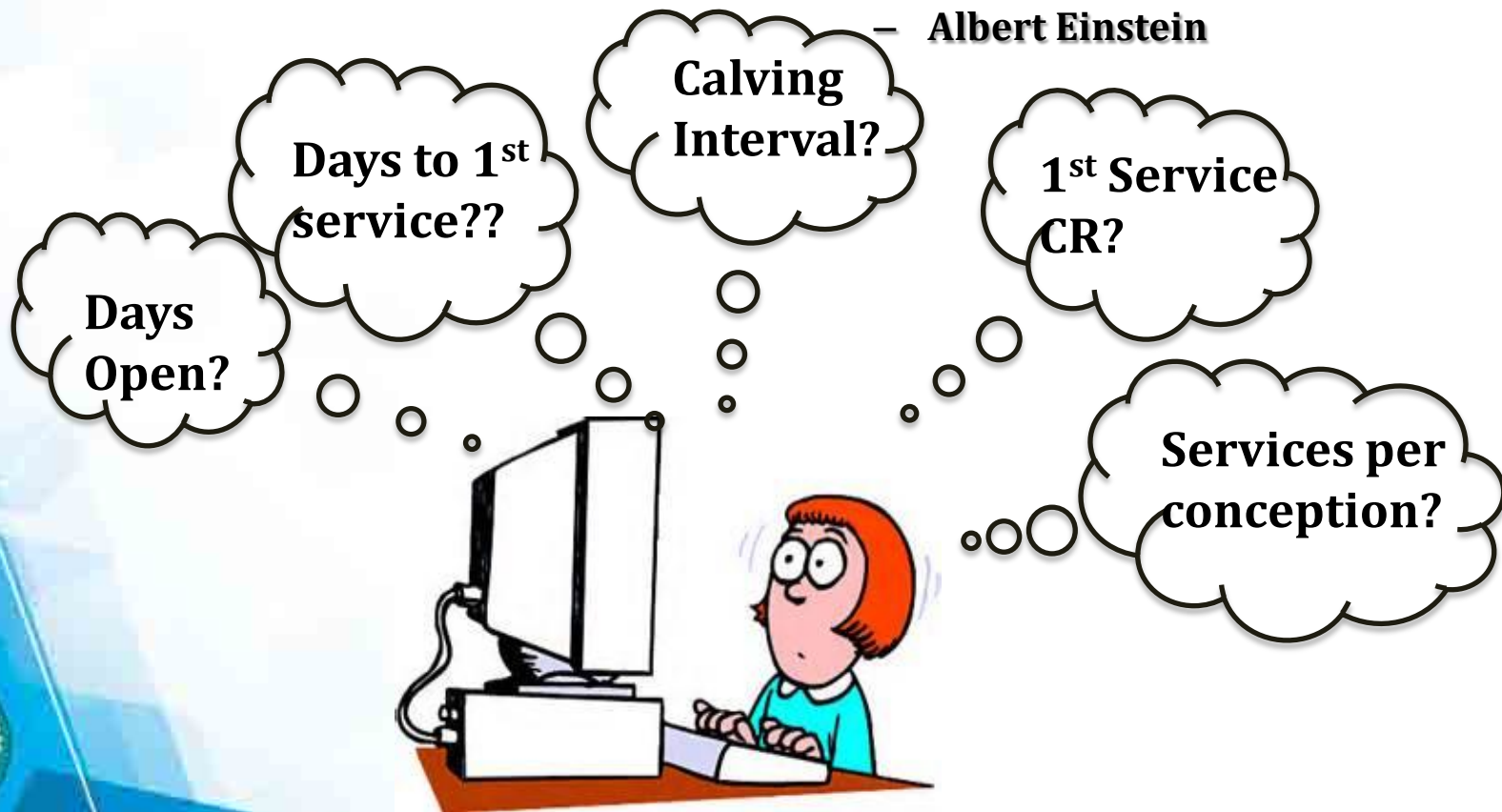
**“Not everything that counts can be counted,
and not everything that can be counted
counts.”**

不是所有有价值的都能被计算,并且,不是所有能计算的都有价值。



-爱因斯坦

- Albert Einstein



Labor 人工

- Heat Detection Accuracy & Aids

发情鉴定准确性和辅助工具

- Between 5-30% of all AI services to observed estrus are conducted at the wrong stage of the estrous cycle. (Appleyard & Cook, 1976; Senger et al., 1988; Smith, 1982)

在所有的人工授精中，约5-30%的发情鉴定在错误的情期阶段做观察。



Labor 人工

- Heat Detection Accuracy & Aids

发情鉴定准确性和辅助工具

- Heat detection aids include: activity systems, chalk or paint, Kamar and more

发情鉴定辅助工具包括：计步器、蜡笔或喷漆等

- Employees need to be trained and retrained in proper heat detection

员工需要反复接受培训，掌握正确的发情鉴定方法



AI Technique 人工授精技术

| Semen Thawing Checklist | | |
|---|--------------|-----------|
| Water temperature is between 90-95 F | Breeder | Daily |
| Water is at or above the fill line | Breeder | Daily |
| Check water thaw unit for any malfunctions | Farm manager | Bi-weekly |
| Semen units remain in the water for 40 or more seconds | Farm manager | Bi-weekly |
| A maximum of 14 straws in the water bath at a time | Farm manager | Bi-weekly |
| Loading Insemination Guns | | |
| Each breeder only pulls 1 straw from the water bath at a time | Farm manager | Bi-weekly |
| Scissors is wiped after each cut | Farm manager | Bi-weekly |
| Rolled sheath protectors are used on every cow | Farm manager | Bi-weekly |
| Guns are pushed all the way down in the gun warmers | Farm manager | Bi-weekly |
| Gun warmers are checked for malfunctions | Farm manager | Weekly |
| Insemination technique checklist | | |
| All semen is deposited | | Weekly |
| Manure is cleaned | | Weekly |
| Adrian's semen deposit | | Weekly |
| Luis's semen deposit | | Weekly |
| Alfredo's semen deposit | | Weekly |
| Lalo's semen deposit | | Weekly |
| Santos's semen deposit placement & insemination technique | Genex Rep | Bi-weekly |
| Chris's semen deposit placement & insemination technique | Genex Rep | Bi-weekly |

Training and retraining is necessary to avoid procedural drift!
反复培训，避免错误的发生。



Measuring Reproductive Performance 评估繁殖表现

Reproductive performance in a dairy herd is determined by how rapidly the herd management system turns **open** cows into **pregnant** cows
牧场的繁殖表现取决于**空怀**牛变为**怀孕**牛的速度

Key Question to ask: **重点问题**

- Which metric can show me how rapidly are cows becoming pregnant in this herd?

哪个指标可以说明牧场中奶牛怀孕的速度？



21 d Pregnancy Rate 21天怀孕率

- Proportion of eligible cows that become pregnant every 21 days
每21天可以配种的奶牛中，怀孕牛所占的比例
- PR is determined by an interaction between the **service rate** and the **conception rate**
怀孕率由参配率和受胎率共同决定



Service Rate 参配率

*Are cows getting
inseminated in a **timely**
manner?*

奶牛及时配种了吗？

SR = % of eligible cows that are bred
every 21 days

参配率指每21天，可以配种的奶牛
中，实际参与配种的比例

could be bred: 100 可以配种的奶牛
共100头

bred: 60 实际配种60头

$60/100 = 60\%$ **SR 参配率60%**



What Affects Service Rate? 影响参配率的因素？

- Estrus behavior/detection
发情表现/鉴定

Environmental factors 环境因素

Mounting surface 爬跨地面

Physiologic factors 生理因素

- Anovular cows: 20-26% at 60-75 DIM
产后60-75天不排卵奶牛约占20-26%

- Milk Production 产奶量

- Heat Stress 热应激



Standing Events 站立发情

| Breed 品种 | Winter 冬季 | Summer 夏季 |
|-----------------|--------------|--------------|
| Holstein 荷斯坦 | 8.6 | 4.5 |
| Jersey 娟姗 | 12.1 | 5.3 |

Nebel et al., J Dairy Sci 80(Suppl 1); 1997



Conception Rate 受胎率

*How efficiently do cows
conceive once they are
bred?*

*奶牛配种后怀孕的效
率?*

- ❖ CR = % of cows that become pregnant after ~~one~~ breeding
受胎率是奶牛一次配种后，怀孕牛所占的比例

pregnant / number bred: 怀孕数/参配数

25 pregnant / 60 bred = $25/60 = 41\%$ CR

25头怀孕/60头配种=41%受胎率

- ❖ CR is mathematically related to services per conception (SPC):
受胎率和每头怀孕需要的配种次数呈负相关

CR=1/SPC 受胎率=1/配种次数

❑ 2 SPC = 50% CR 2次配种=50%受胎率

❑ 3 SPC = 33% CR 3次配种=33%受胎率

❑ 4 SPC = 25% CR 4次配种=25%受胎率

The number of AI services get a cow pregnant depends on the conception rate
奶牛怀孕所需的配种次数取决于受胎率

**Conception
Rate = 50%
受胎率50%**

**Conception
Rate = 30%
受胎率30%**

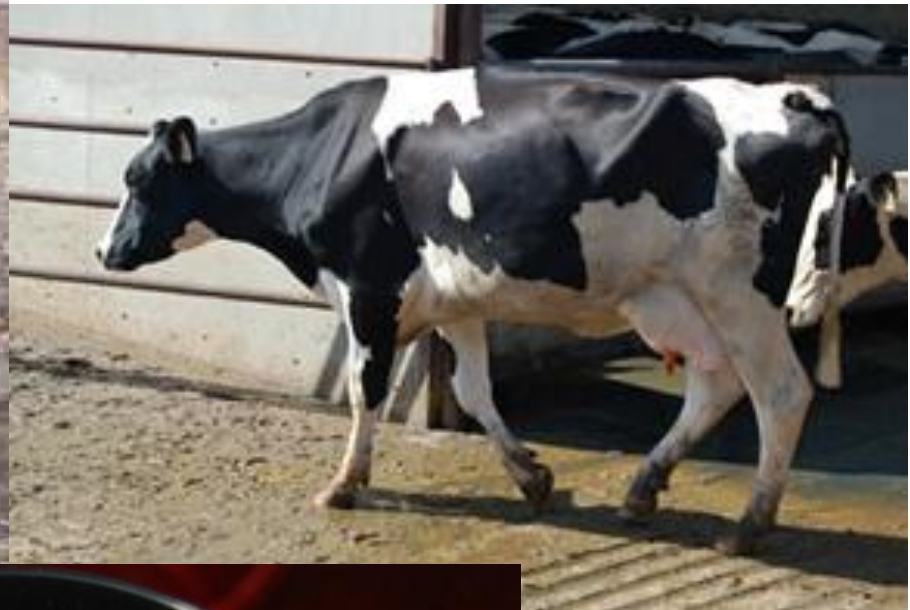
| AI 配次 | # Bred 待配数 | # Preg 怀孕数 | Total Preg 总怀孕数 |
|----------|---------------|---------------|--------------------|
| 1 | 100 | 50 | 50 |
| 2 | 50 | 25 | 75 |
| 3 | 25 | 12 | 87 |
| 4 | 13 | 5 | 92 |

| AI 配次 | # Bred 待配数 | # Preg 怀孕数 | Total Preg 总怀孕数 |
|----------|---------------|---------------|--------------------|
| 1 | 100 | 30 | 30 |
| 2 | 70 | 21 | 51 |
| 3 | 49 | 15 | 66 |
| 4 | 34 | 10 | 76 |
| 5 | 24 | 7 | 83 |
| 6 | 17 | 5 | 88 |



What Affects Conception Rate? 影响受孕率的因素？





What do the numbers say? 这些数字说明什么？



1st Service CR and Metritis

首次配种受胎率和子宫炎关系

1st CR for metritis 子宫炎牛首次配种

1st CR no metritis 非子宫炎牛首次配种

| Bred Number | %Conc | #Preg | #Open | Other | Abort | Total | %Tot | SPC | | %Conc | #Preg | #Open | Other | Abort | Total | %Tot | SPC |
|-------------|-------|-------|-------|-------|-------|-------|------|-----|--------|-------|-------|-------|-------|-------|-------|------|-----|
| 1 | 12 | 7 | 49 | 3 | 0 | 59 | 29 | 8.0 | 1 | 35 | 438 | 798 | 67 | 28 | 1303 | 35 | 2.8 |
| 2 | 21 | 9 | 33 | 3 | 0 | 45 | 22 | 4.7 | 2 | 29 | 225 | 563 | 28 | 10 | 816 | 22 | 3.5 |
| 3 | 21 | 7 | 26 | 0 | 2 | 33 | 16 | 4.7 | 3 | 26 | 137 | 394 | 19 | 7 | 550 | 15 | 3.9 |
| 4 | 23 | 5 | 17 | 0 | 0 | 22 | 11 | 4.4 | 4 | 26 | 94 | 268 | 8 | 5 | 370 | 10 | 3.9 |
| 5 | 33 | 5 | 10 | 0 | 0 | 15 | 7 | 3.0 | 5 | 22 | 53 | 184 | 13 | 3 | 250 | 7 | 4.5 |
| 6 | 11 | 1 | 8 | 0 | 0 | 9 | 4 | 9.0 | 6 | 19 | 29 | 126 | 3 | 1 | 158 | 4 | 5.3 |
| 7 | 0 | 0 | 6 | 1 | 0 | 7 | 3 | | 7 | 23 | 25 | 83 | 0 | 0 | 108 | 3 | 4.3 |
| 8 | 25 | 1 | 3 | 0 | 0 | 4 | 2 | 4.0 | 8 | 17 | 11 | 52 | 0 | 0 | 63 | 2 | 5.7 |
| OTHERS | 0 | 0 | 9 | 0 | 0 | 9 | 4 | | OTHERS | 20 | 16 | 66 | 3 | 2 | 85 | 2 | 5.1 |
| TOTALS | 18 | 35 | 161 | 7 | 2 | 203 | 100 | 5.6 | TOTALS | 29 | 1028 | 2534 | 141 | 56 | 3703 | 100 | 3.5 |



Lame<100 DIM and CR 产后100天内跛行和受胎 率关系

BREDSUM ... FOR LAMTX=1-100

| | %Conc | #Preg | #Open | Other | Abort | Total | %Tot | SPC |
|--------|-------|-------|-------|-------|-------|-------|------|------|
| 1 | 28 | 51 | 128 | 14 | 5 | 193 | 37 | 3.5 |
| 2 | 29 | 35 | 84 | 7 | 1 | 126 | 24 | 3.4 |
| 3 | 33 | 25 | 51 | 2 | 3 | 78 | 15 | 3.0 |
| 4 | 31 | 13 | 29 | 1 | 0 | 43 | 8 | 3.2 |
| 5 | 4 | 1 | 26 | 1 | 0 | 28 | 5 | 27.0 |
| 6 | 23 | 5 | 17 | 2 | 0 | 24 | 5 | 4.4 |
| 7 | 23 | 3 | 10 | 0 | 0 | 13 | 2 | 4.3 |
| 8 | 0 | 0 | 6 | 0 | 0 | 6 | 1 | |
| OTHERS | 8 | 1 | 11 | 0 | 0 | 12 | 2 | 12.0 |
| TOTALS | 27 | 134 | 362 | 27 | 9 | 523 | 100 | 3.7 |

**1st CR for lame 28% CR
跛行牛首次配种受胎率28%**

BREDSUM ... FOR LAMTX=0

| | %Conc | #Preg | #Open | Other | Abort | Total | %Tot | SPC |
|--------|-------|-------|-------|-------|-------|-------|------|-----|
| 1 | 36 | 341 | 610 | 54 | 19 | 1005 | 37 | 2.8 |
| 2 | 28 | 163 | 420 | 22 | 7 | 605 | 22 | 3.6 |
| 3 | 27 | 105 | 291 | 15 | 5 | 411 | 15 | 3.8 |
| 4 | 28 | 73 | 190 | 6 | 3 | 269 | 10 | 3.6 |
| 5 | 27 | 43 | 118 | 11 | 1 | 172 | 6 | 3.7 |
| 6 | 18 | 18 | 82 | 0 | 1 | 100 | 4 | 5.6 |
| 7 | 19 | 14 | 58 | 1 | 0 | 73 | 3 | 5.1 |
| 8 | 22 | 10 | 35 | 0 | 0 | 45 | 2 | 4.5 |
| OTHERS | 19 | 10 | 43 | 2 | 2 | 55 | 2 | 5.3 |
| TOTALS | 30 | 777 | 1847 | 111 | 38 | 2735 | 100 | 3.4 |

**1st CR for not lame 36% CR
非跛行牛首次配种受胎率36%**

First mastitis case = <100 DIM

产后100天内首发乳房炎

30% 1st SCR for mastitis

36% 1st SCR for no mastitis

BREDSUM ... FOR MASTX=1-100

| | %Conc | #Preg | #Open | Other | Abort | Total | %Tot | SPC |
|--------|-------|-------|-------|-------|-------|-------|------|------|
| 1 | 30 | 43 | 100 | 11 | 3 | 154 | 37 | 3.3 |
| 2 | 28 | 26 | 66 | 3 | 2 | 95 | 23 | 3.5 |
| 3 | 24 | 14 | 44 | 3 | 0 | 61 | 14 | 4.1 |
| 4 | 18 | 7 | 32 | 2 | 1 | 41 | 10 | 5.6 |
| 5 | 27 | 8 | 22 | 2 | 0 | 32 | 8 | 3.8 |
| 6 | 10 | 2 | 18 | 0 | 0 | 20 | 5 | 10.0 |
| 7 | 30 | 3 | 7 | 0 | 0 | 10 | 2 | 3.3 |
| 8 | 0 | 0 | 5 | 0 | 0 | 5 | 1 | |
| OTHERS | 50 | 1 | 1 | 1 | 0 | 3 | 1 | 2.0 |
| TOTALS | 26 | 104 | 295 | 22 | 6 | 421 | 100 | 3.8 |

BREDSUM ... FOR MASTX=0

| | %Conc | #Preg | #Open | Other | Abort | Total | %Tot | SPC |
|--------|-------|-------|-------|-------|-------|-------|------|-----|
| 1 | 36 | 342 | 614 | 58 | 20 | 1014 | 36 | 2.8 |
| 2 | 28 | 168 | 432 | 22 | 6 | 622 | 22 | 3.6 |
| 3 | 25 | 102 | 301 | 15 | 7 | 418 | 15 | 4.0 |
| 4 | 28 | 77 | 199 | 4 | 4 | 280 | 10 | 3.6 |
| 5 | 22 | 39 | 137 | 8 | 3 | 184 | 6 | 4.5 |
| 6 | 22 | 24 | 87 | 2 | 1 | 113 | 4 | 4.6 |
| 7 | 16 | 13 | 67 | 1 | 0 | 81 | 3 | 6.2 |
| 8 | 22 | 11 | 39 | 0 | 0 | 50 | 2 | 4.5 |
| OTHERS | 15 | 11 | 63 | 1 | 1 | 75 | 3 | 6.7 |
| TOTALS | 29 | 787 | 1939 | 111 | 42 | 2837 | 100 | 3.5 |



Conception Rate Quiz 受胎率测验

10 cows receive AI
对10头奶牛人工授精



4 cows show heat at 21 d and are rebred
配种21天后4头奶牛发情并重新配种

6 cows presented to veterinarian
for pregnancy check at 35 d
6头奶牛在配种后35天接受妊娠检查



3 cows are
diagnosed pregnant
妊娠检查结果3头怀孕

3 cows are
diagnosed open
妊娠检查结果3头空怀

What is the Conception Rate? 受胎率?



Adapted
from Dr.
Paul Fricke

Fertility Math 繁殖计算

Service Rate (SR) 参配率

bred / number could be bred

(i.e. $60/100=60\%$ SR)

配种数量/应该配种数量

(例如 $60/100=60\%$ 参配率)

Conception rate (CR) 受胎率

pregnant / number bred

(25 pregnant / 60 bred = $25/60 =$

41% CR)

怀孕数量/配种数量

(例如 25 怀孕 / 60 配种 = 41% 受胎率)

Pregnancy rate (PR) 怀孕率

pregnant / number could be

bred

($25/100$ cows = 25% PR)

怀孕数量/应该配种数量

($25/100$ 奶牛 = 25% 怀孕

率)



Pregnancy Rate Example 1 怀孕率举例1

100% Conception Rate; 10% Service Rate 受胎率100% ; 参配率10%



10 nonpregnant cows past the voluntary
waiting period
(i.e., eligible to become pregnant)
10头未孕度过主动停配期
(能够配种并怀孕)

AI one cow after 21 d
(i.e., 10% service
rate)
21天后1头牛怀孕
(10%参配率)

What is the
Pregnancy Rate?
怀孕率是多少？

Pregnancy Rate Example 2 怀孕率举例2

10% Conception Rate; 100% Service Rate 受胎率10% ; 参配率100%



10 nonpregnant cows past the voluntary
waiting period
(i.e., eligible to become pregnant)
10头未孕度过主动停配期
(能够配种并怀孕)

AI one cow after 21 d
(i.e., 10% conception
rate)
21天后1头牛怀孕
(10%受胎率)

What is the
Pregnancy Rate?
怀孕率是多少？



Pregnancy Rate Example 3 怀孕率举例3

50% Conception Rate; 80% Service Rate 受胎率50% ; 参配率80%



10 nonpregnant cows past the voluntary
waiting period
(i.e., eligible to become pregnant)
10头未孕度过主动停配期
(能够配种并怀孕)

What is the
Pregnancy Rate?
怀孕率是多少？

4 cows pregnant after
21 d
21天后4头奶牛怀孕

21-Day

Pregnancy Rate 21天怀孕率

| Date | Br Elig | Bred | Pct | Pg Elig | Preg | Pct | Aborts |
|--------------|--------------|-------------|-----------|--------------|-------------|-----------|------------|
| 6/19/14 | 902 | 464 | 51 | 891 | 147 | 16 | 13 |
| 7/10/14 | 955 | 477 | 50 | 945 | 161 | 17 | 12 |
| 7/31/14 | 1015 | 559 | 55 | 990 | 173 | 17 | 15 |
| 8/21/14 | 1031 | 525 | 51 | 1009 | 159 | 16 | 22 |
| 9/11/14 | 1061 | 586 | 55 | 1043 | 192 | 18 | 18 |
| 10/02/14 | 1102 | 577 | 52 | 1078 | 194 | 18 | 20 |
| 10/23/14 | 1120 | 611 | 55 | 1095 | 219 | 20 | 25 |
| 11/13/14 | 1065 | 593 | 56 | 1041 | 203 | 20 | 25 |
| 12/04/14 | 1006 | 592 | 59 | 982 | 209 | 21 | 19 |
| 12/25/14 | 974 | 560 | 57 | 927 | 174 | 19 | 9 |
| 1/15/15 | 978 | 543 | 56 | 953 | 188 | 20 | 9 |
| 2/05/15 | 968 | 570 | 59 | 944 | 198 | 21 | 10 |
| 2/26/15 | 963 | 568 | 59 | 949 | 204 | 21 | 10 |
| 3/19/15 | 931 | 516 | 55 | 921 | 191 | 21 | 9 |
| 4/09/15 | 940 | 506 | 54 | 918 | 177 | 19 | 3 |
| 4/30/15 | 955 | 505 | 53 | 936 | 176 | 19 | 0 |
| 5/21/15 | 910 | 468 | 51 | 0 | 0 | 0 | 0 |
| 6/11/15 | 738 | 487 | 66 | 0 | 0 | 0 | 0 |
| Total | 15966 | 8752 | 55 | 15622 | 2965 | 19 | 219 |

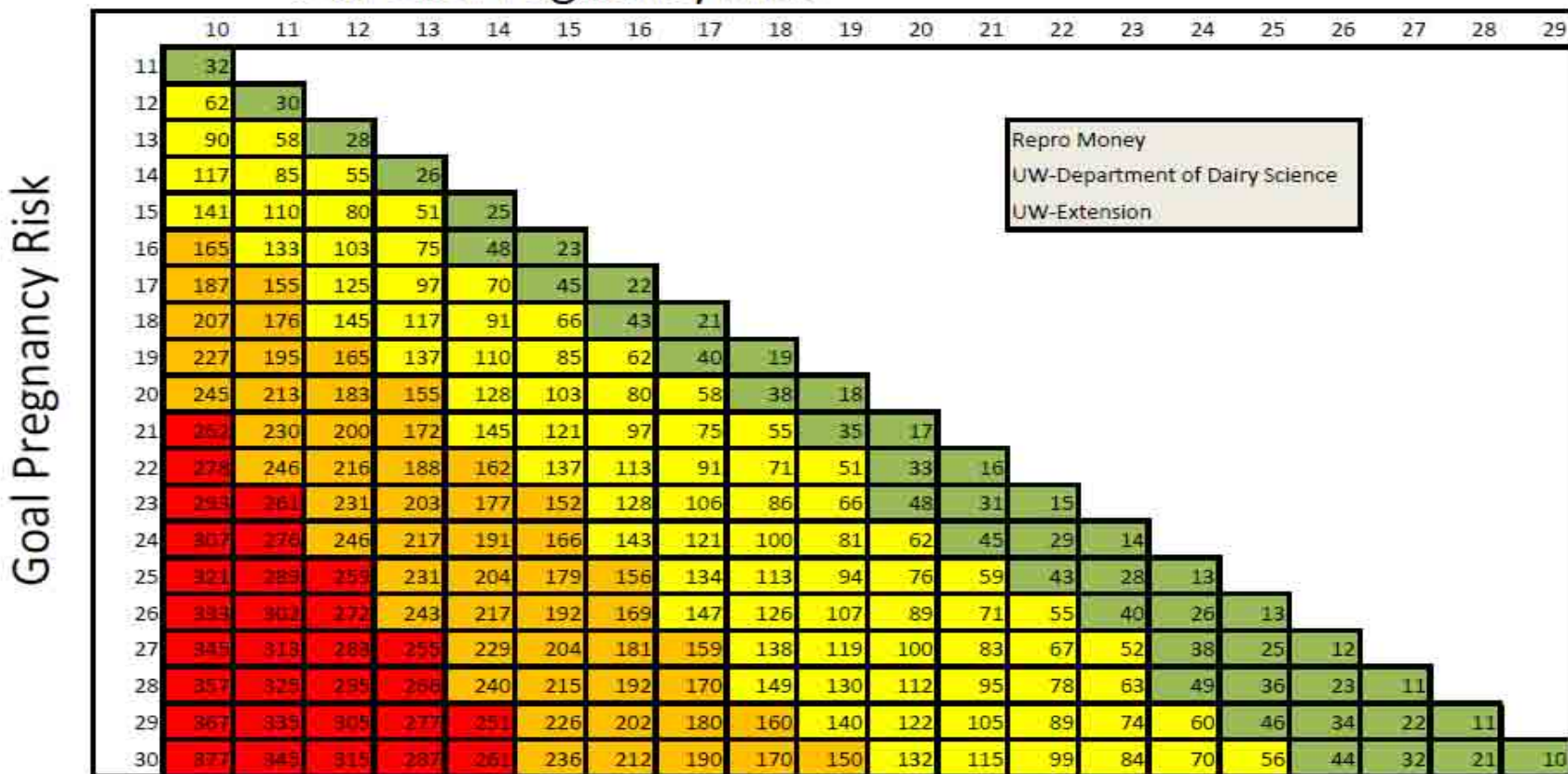


What is the financial impact of improving pregnancy rates?

提高怀孕率对牧场效益有什么影响？

Financial Impact of Reproductive Performance

Current Pregnancy Risk



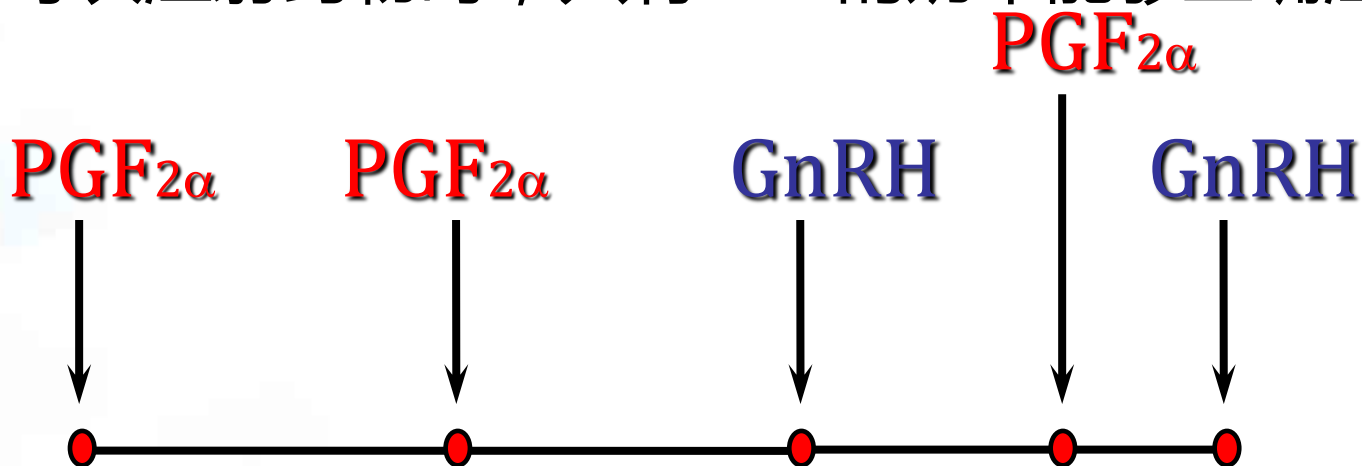
Synch Programs 同期计划



Compliance – IATF 服从

On any given day, 95% of your cows
get the correct injection (Presynch-Ovsynch)

每次注射药物时，只有95%的奶牛能够正确注射

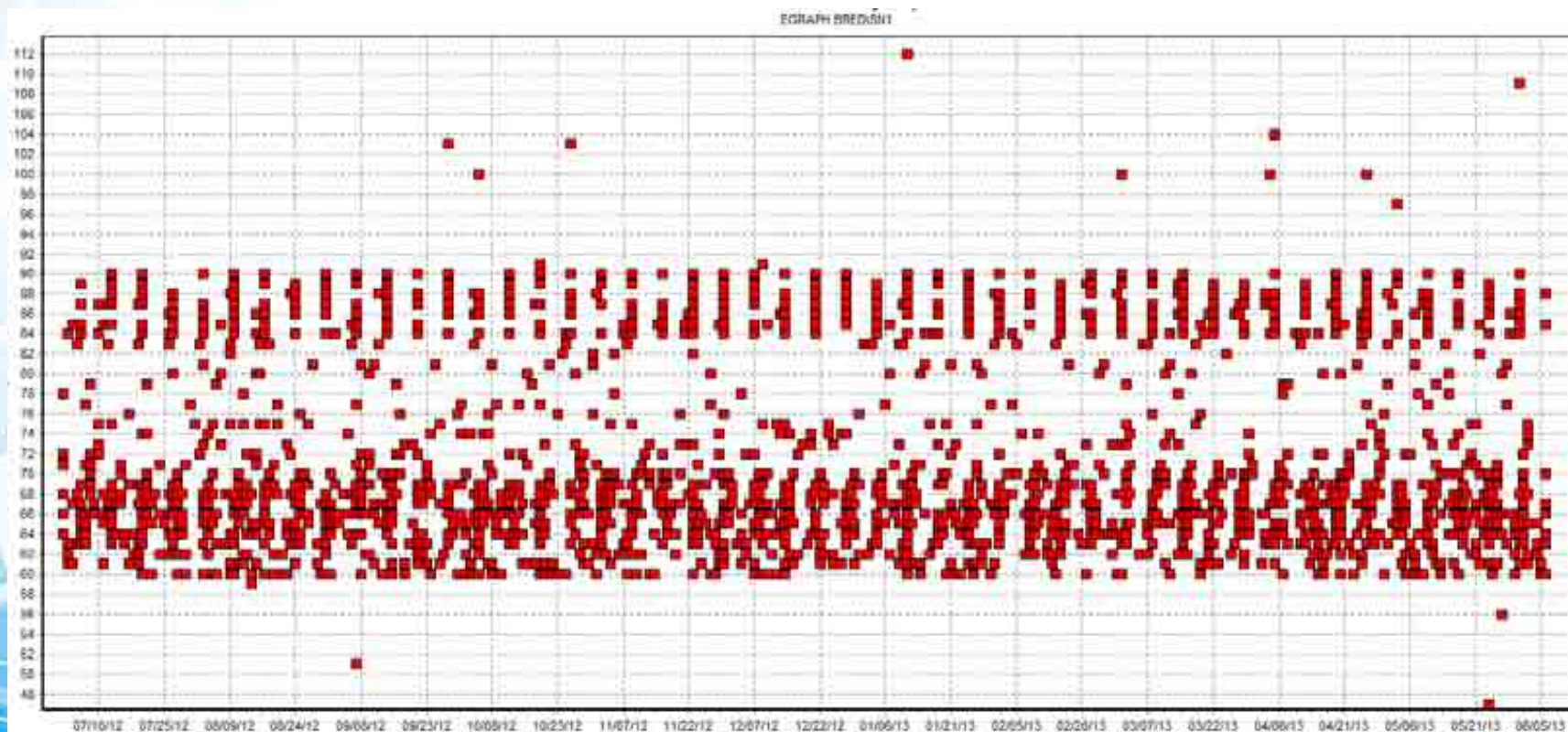


$$0.95 \times 0.95 \times 0.95 \times 0.95 \times 0.95 = 77\%$$

$$0.9 \times 0.9 \times 0.9 \times 0.9 \times 0.9 = 59\%$$

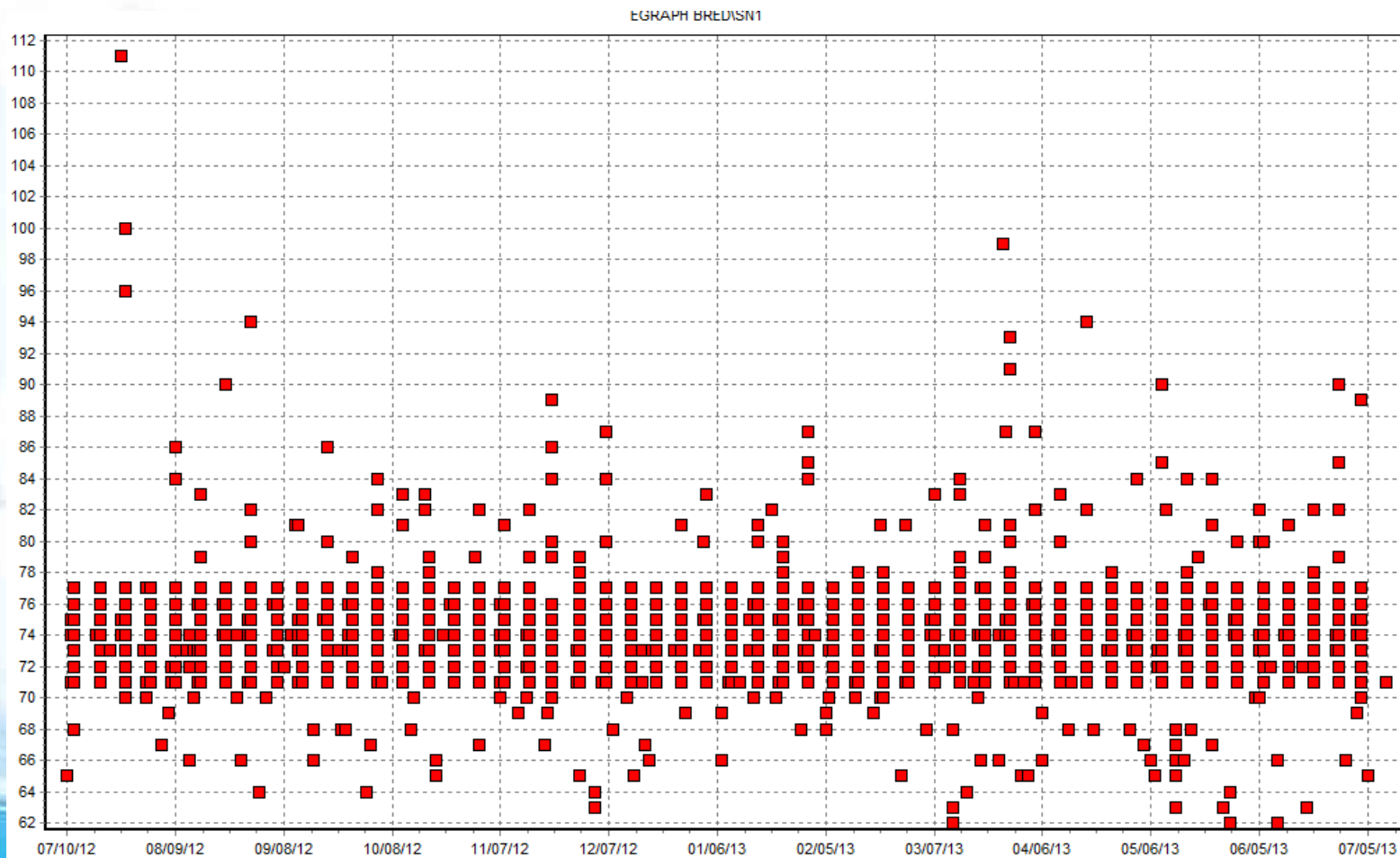
Adapted
from Dr.
Paul Fricke

Compliance to Protocol 按照流程执行



60 VWP 主动停配期
PG RATE = 35% 怀孕率



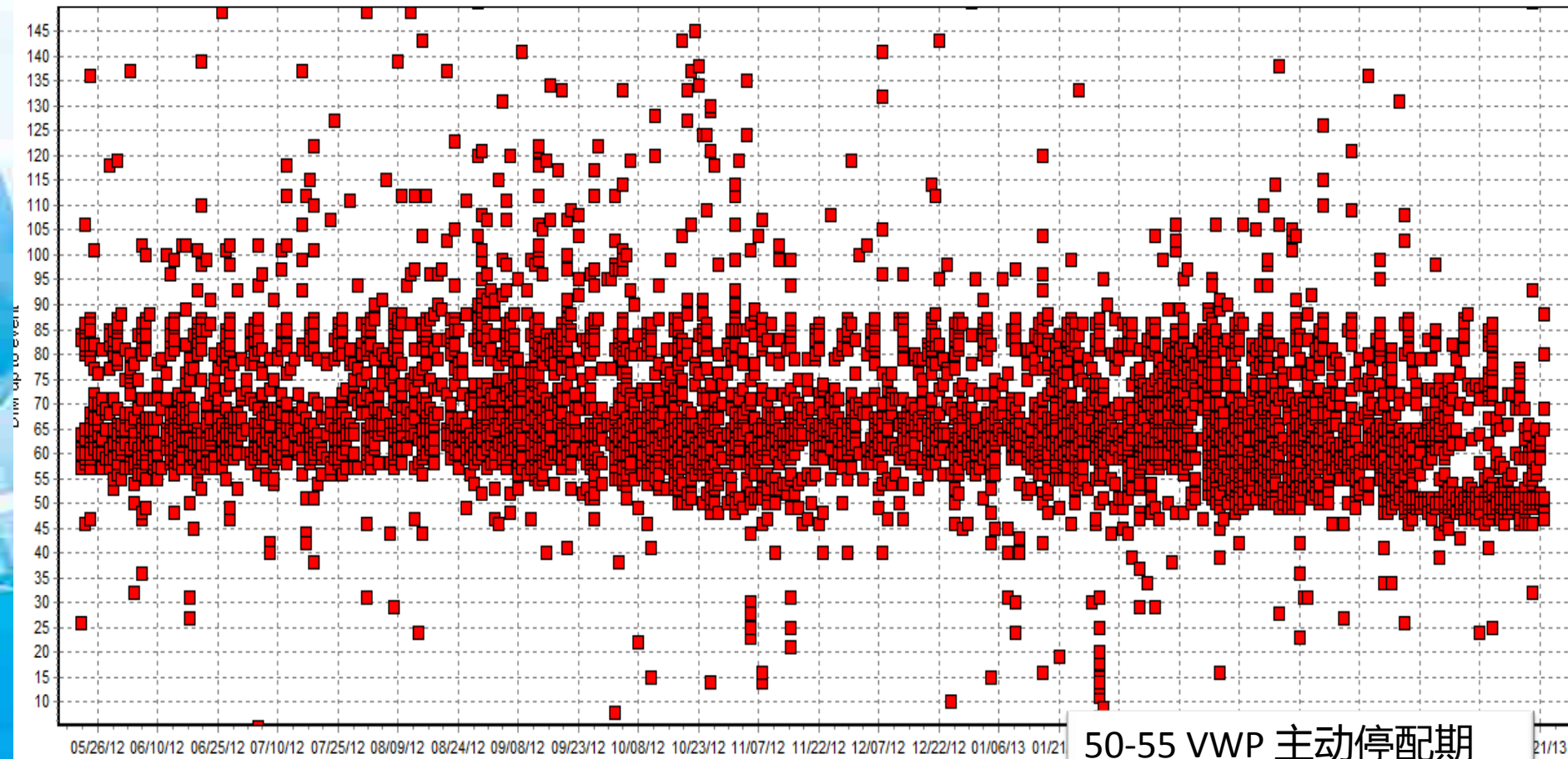


71 VWP 主动停配期
PR Rate = 37% 怀孕率



What is taking place here? 发生了什么？

EGRAPH BRED\SN1



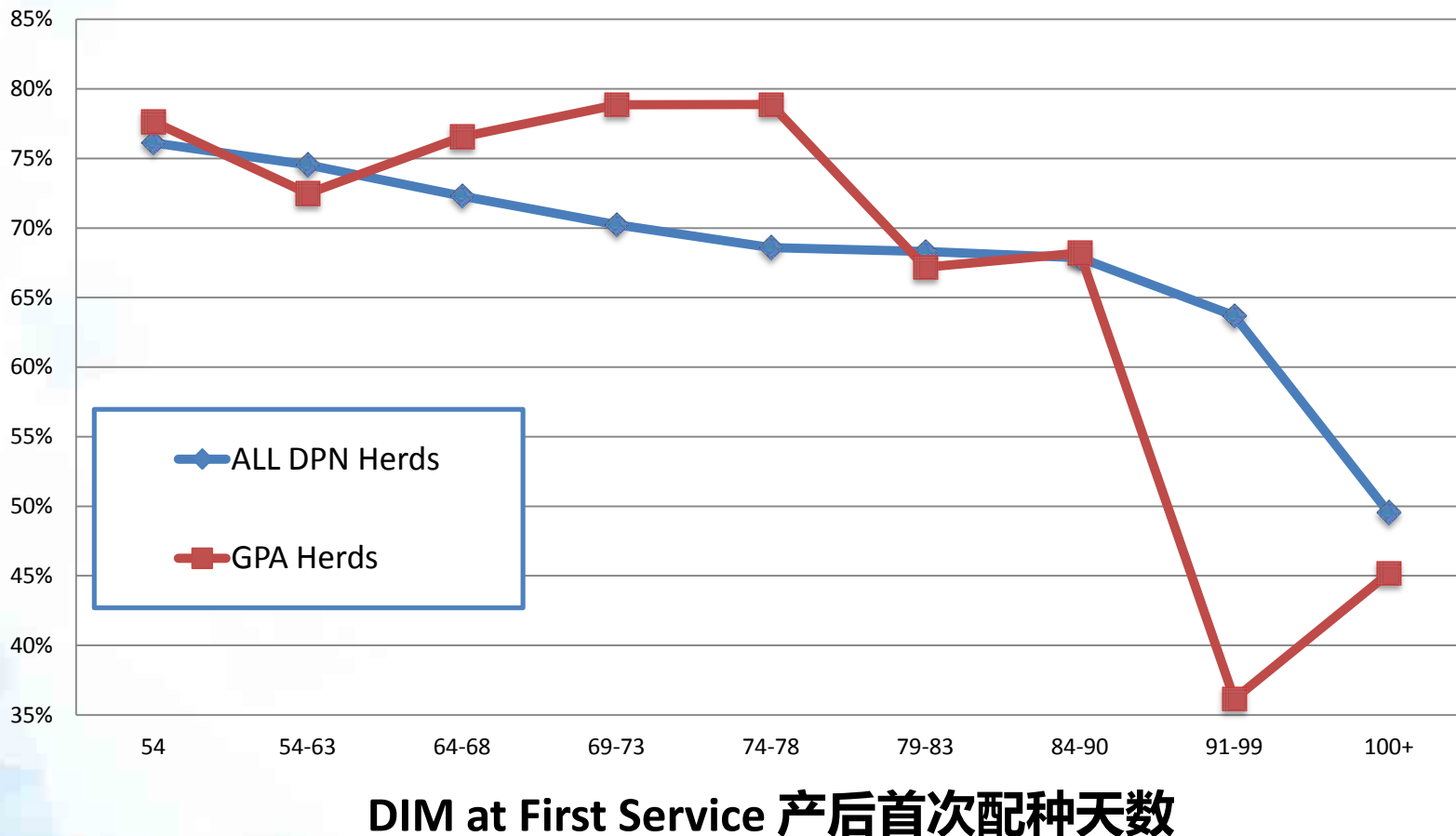
50-55 VWP 主动停配期
PREG RATE = 16% 怀孕率



Does VWP affect pregnancy rate?

主动停配期会影响怀孕率吗？

% Pregnant by 200 DIM
产后200天怀孕牛比例



Data retrieved from DPN database July 2013
79,470 cows with pregnancy diagnosis

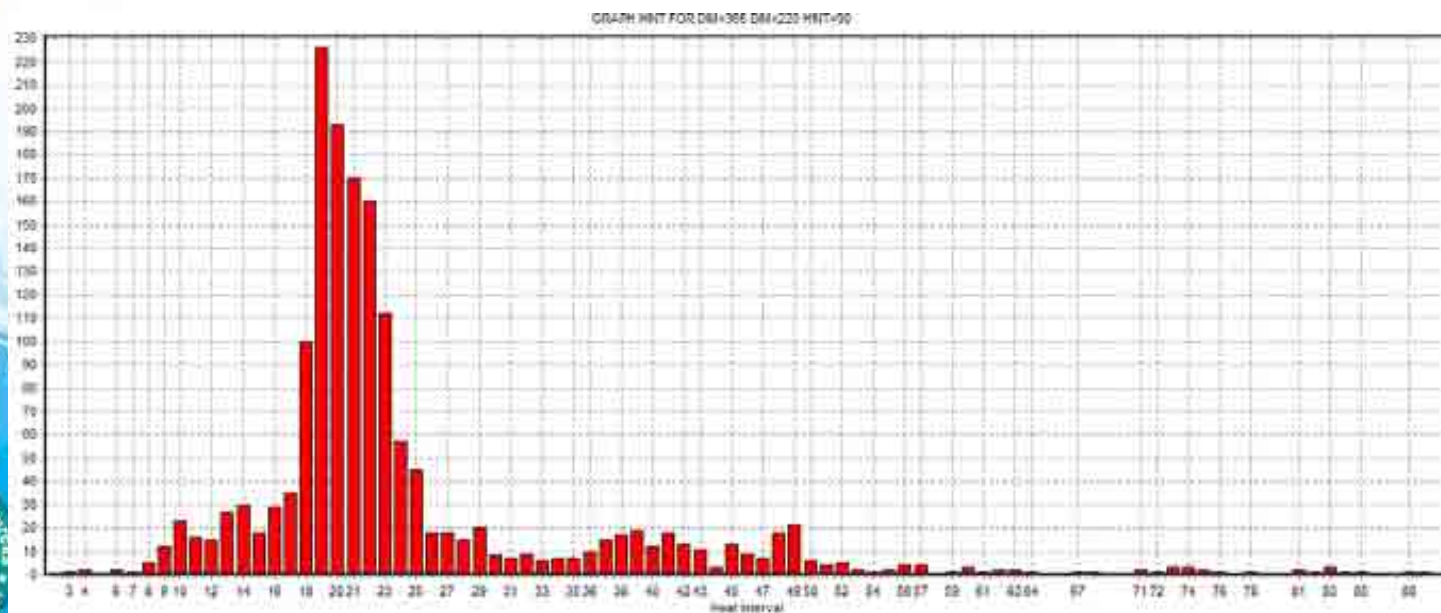
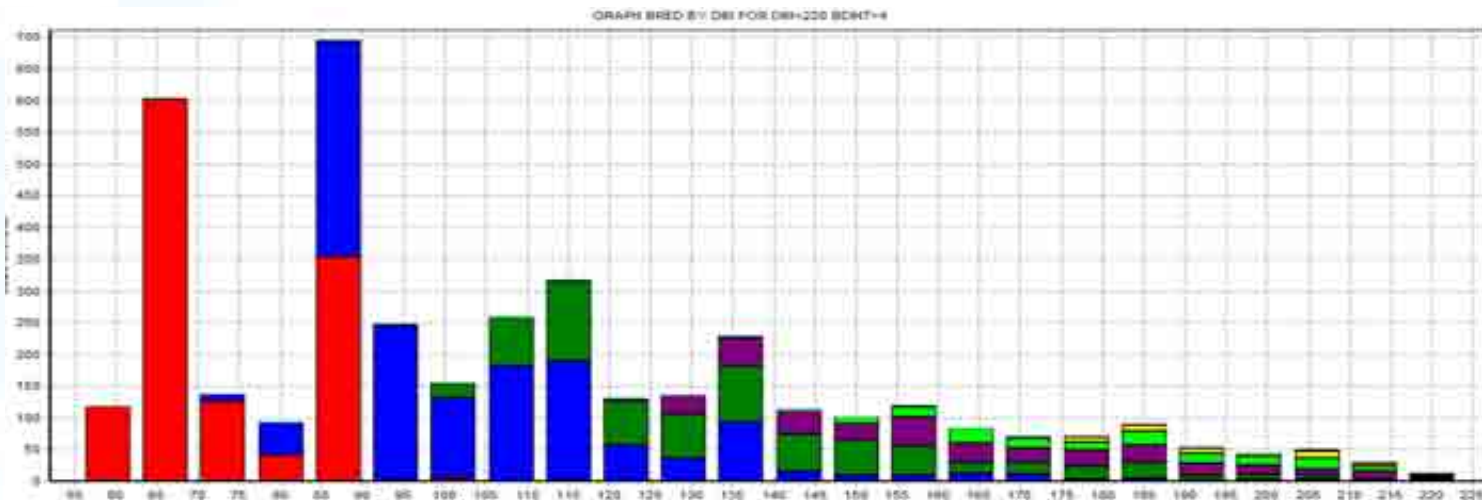


Re enrollment 再次配种

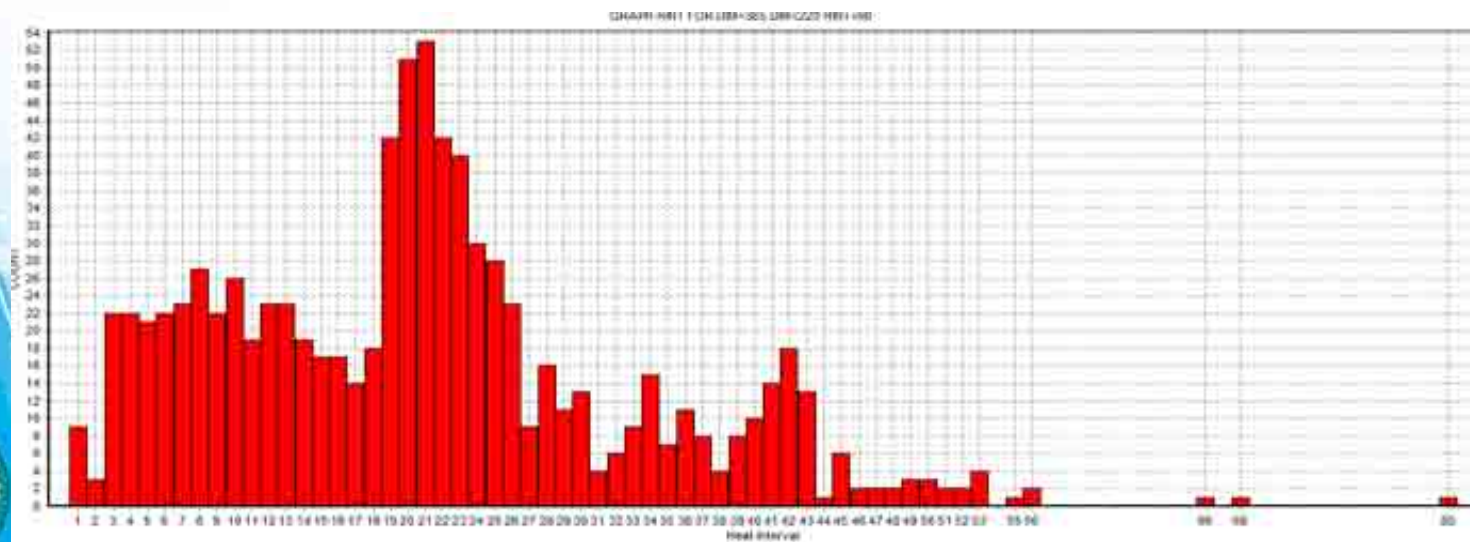
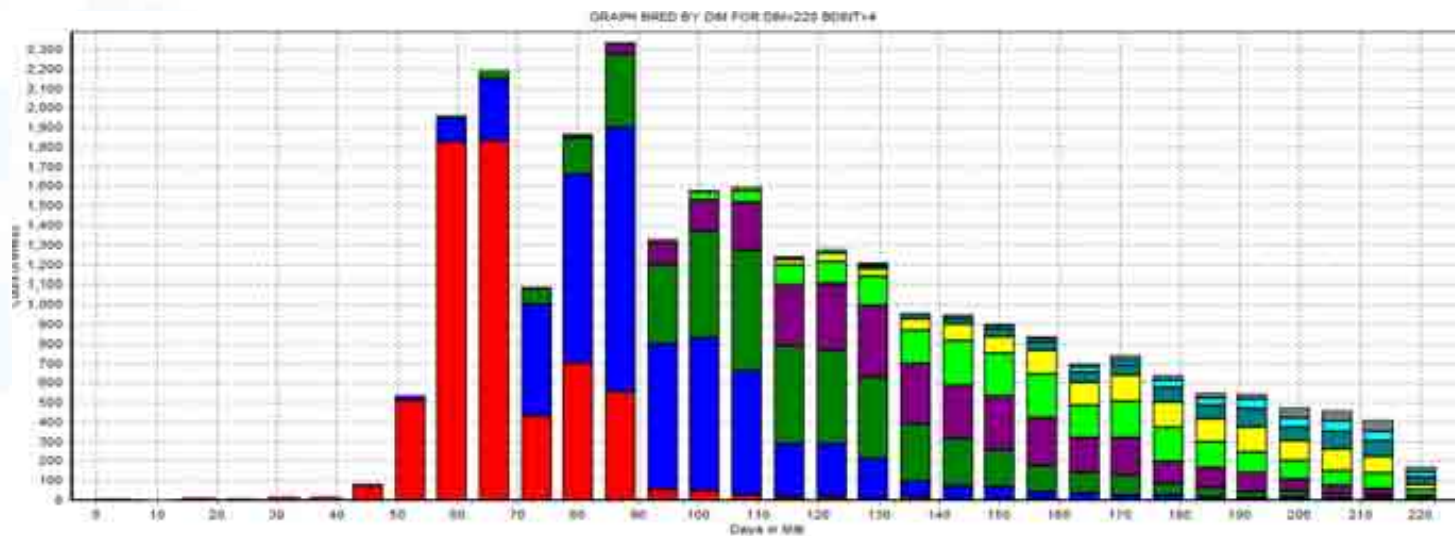
- Find non pregnant cows early
(not too early)
尽早发现空怀牛（不能太早）
- Rapidly return open cows to AI service
空怀牛应快速接受再次配种



Re enrollment – Herd A 牧场A再次配种

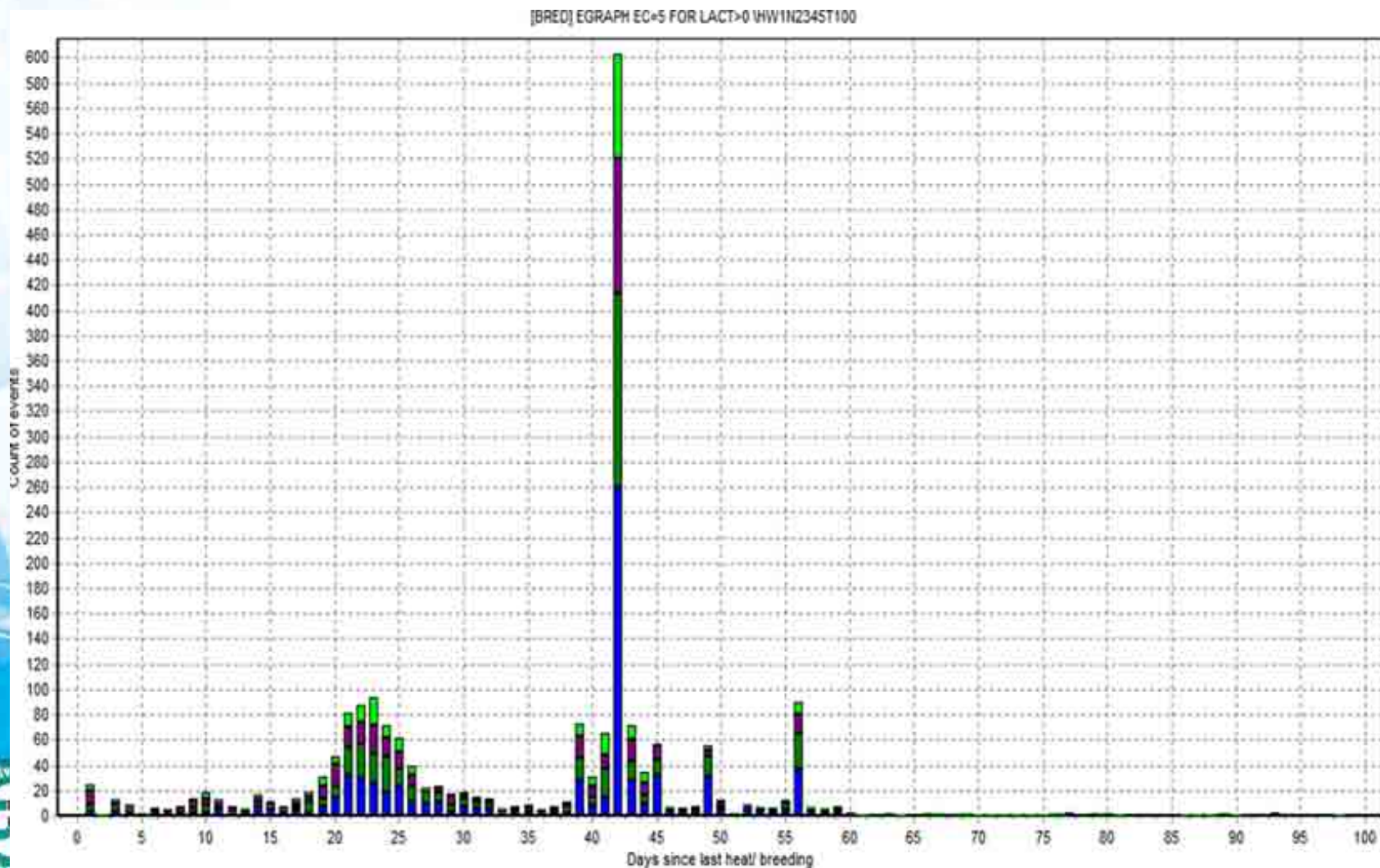


Re enrollment – Herd C 牧场C再次配种



Re enrollment – Example synch herd

再次配种—同期发情示例



Benchmarking Your Numbers

用基准对照你的数据



Recordkeeping: “I don’t have time to keep records”... 保存记录：“我没有时间保存记录”

- If you cannot measure it, you cannot manage it.
如果你不能评估它，你就不能管理它。
- Focus on areas that need improvement
关注需要改进的方面
 - Be proactive rather than reactive
要主动做出改进而不是被迫做出改进
- The whole story
详细全面的了解
- Trends (SCC, seasonality, etc)
趋势（体细胞数、季节性等）
- Dissipates “perceived” issues
解决“已发现”的问题



Recordkeeping: “I don't have time to keep records”... 保存记录：“我没有时间保存记录”

- Saves time! You'll likely make the mistake once
节约时间！你将不会再犯同样的错误
- Setting goals and finding opportunities
设定目标，找到机会
 - Was that decision a good one? Do you know its economic impact?
Without evaluating these decisions you cannot move forward.
之前的决定正确吗？你知道这个决定带来的经济影响吗？如果不对这些决定作出评估，你将无法进步
 - As the business gets more competitive, farmers need to find new ways to increase their efficiency
随着市场竞争越来越激烈，牧场主需要找到提高效率的新方法



Summary of the Big Four Profit Related Measures*

| 四大效益相关指数总结 | Benchmark | Current BPM | | | | |
|--|---------------------------------------|-------------|-----------|-----------|-----------|----------|
| | UpMw - HO >1000 - TOP 50 (n=46) | 6/26/2015 | 1/25/2015 | 6/23/2014 | 12/4/2013 | 3/4/2013 |
| Reproduction | | | | | | |
| Voluntary waiting period | 57 | 70 | 70 | 70 | 70 | 70 |
| Conception rate | 36% | 39% | 40% | 40% | 38% | 36% |
| Service rate | 61% | 62% | 60% | 61% | 60% | 59% |
| Pregnancy rate | 21.7% | 24% | 23% | 23% | 22% | 20% |
| Percent of herd pregnant by 150 DIM (Entire Herd) | 68% | 66% | 68% | 67% | 64% | 62% |
| Est. annual change of income if your herd's pregnancy rate met the benchmark | | -\$259,774 | | | | |
| Milk Production | | | | | | |
| First lactation, average milk per day | 77 | 80 | 76 | 82 | 80 | 80 |
| Second lactation and greater, average milk per day | 91 | 96 | 92 | 94 | 90 | 90 |
| Average fat percent | 3.7% | 3.5% | 3.8% | 4.0% | 3.9% | 3.9% |
| Average protein percent | 3.1% | 3.1% | 3.3% | 3.1% | 3.3% | 3.2% |
| First lactation, total pounds fat and protein per day | 5.2 | 5.3 | 5.4 | 5.8 | 5.8 | 5.7 |
| Second lactation & greater, total pounds fat & protein per day | 6.2 | 6.3 | 6.5 | 6.7 | 6.5 | 6.4 |
| Est. annual change of income if your herd's production met the benchmark | | -\$875,058 | | | | |
| Somatic Cell Count | | | | | | |
| Average log cell score | 2.5 | 1.8 | 1.8 | 2.0 | 2.1 | 2.1 |
| First lactation, average log cell score | 2.2 | 1.7 | 1.5 | 1.9 | 1.8 | 1.9 |
| Second lactation and greater, average log cell score | 2.8 | 2.0 | 1.9 | 2.2 | 2.3 | 2.2 |
| Percent herd with last two log scores greater than 4.0 | 13% | 7% | 6% | 8% | 8% | 8% |
| Est. annual change of income if your herd's SCC met the benchmark | | -\$474,042 | | | | |
| Culling | | | | | | |
| Percent Culls Died | 20% | 15% | 15% | 17% | 17% | 16% |
| Percent Culls Sold | 80% | 85% | 85% | 83% | 83% | 84% |
| Turnover rate | 39% | 43% | 43% | 45% | 46% | 42% |
| Est. annual change of income if your herd's turnover rate met the benchmark | | -\$85,000 | | | | |

Dry Cow and Transition

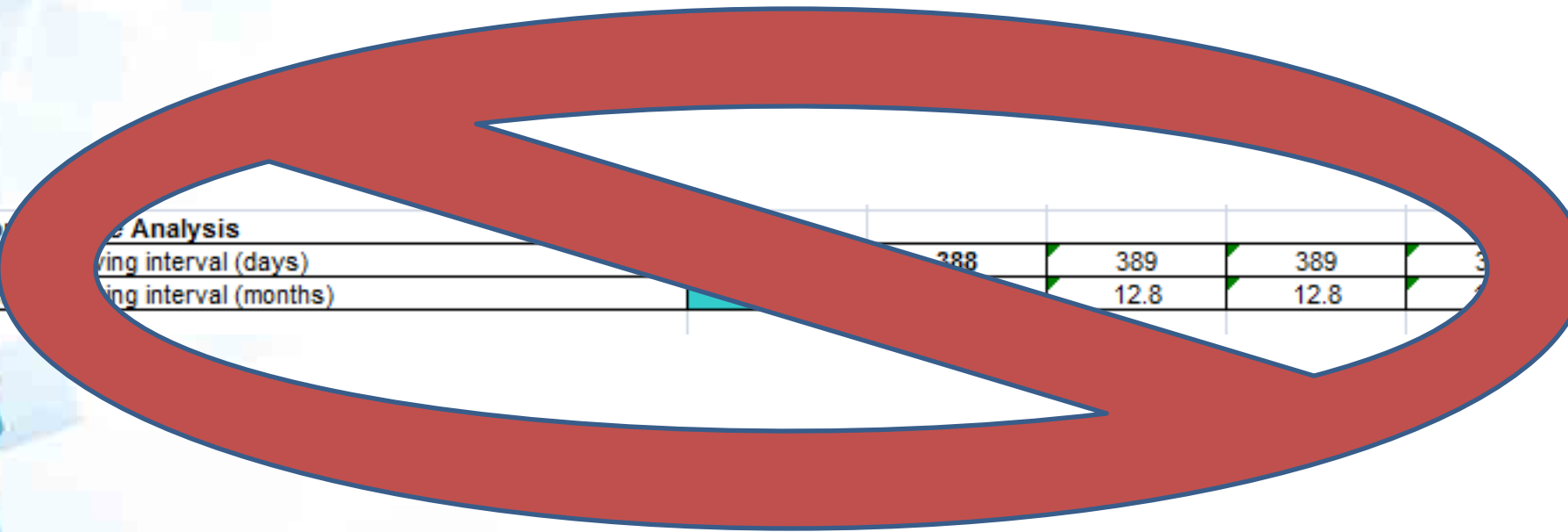
干奶牛和围产牛

Dry Period Analysis

| | Benchmark | 6/26/2015 | 1/25/2015 | 6/23/2014 | 12/4/20 |
|--|-----------|-----------|-----------|-----------|---------|
| Average days dry | 56 | 47 | 46 | 48 | 47 |
| Percent of cows dry less than 45 days | 24% | 56% | 60% | 53% | 61% |
| Percent of cows dry 45 to 75 days | 67% | 43% | 40% | 46% | 35% |
| Percent of cows dry more than 75 days | 9% | 1% | 0% | 1% | 4% |
| Percent culled in first 60 DIM when dry <45 days | 12% | 9% | 9% | 8% | 7% |
| Percent culled in first 60 DIM when dry >45 and <75 days | 8% | 13% | 14% | 16% | 17% |
| Percent culled in first 60 DIM when dry >75 days | 18% | 27% | 0% | 67% | 28% |
| Percent dry cow cures | 69% | 84% | 73% | 85% | 78% |
| Percent new infections during dry and transition period | 17% | 9% | 11% | 5% | 10% |
| Health Analysis | | | | | |
| Percent DAs in last 120 days | 4% | 0% | 0% | 0% | 1% |
| Percent clinical mastitis in last 120 days | 13% | 4% | 4% | 5% | 6% |
| Percent retained placentas in last 120 days | 7% | 1% | 0% | 1% | 1% |



Calving Intervals 产犊间隔



| Report | Analysis | | | | |
|---------|---------------------------|-----|------|------|------|
| Average | Calving interval (days) | 388 | 389 | 389 | 389 |
| Average | Calving interval (months) | | 12.8 | 12.8 | 12.8 |

| | Benchmark | 6/26/2015 | 1/25/2015 | 6/23/2014 | 12/4/2013 |
|---|-----------|-----------|-----------|-----------|-----------|
| Service rate | 61% | 62% | 60% | 61% | 60% |
| Pregnancy rate | 21.7% | 24% | 23% | 23% | 22% |
| First lactation pregnancy rate | 23.6% | 24% | 23% | 22% | 22% |
| Second lactation and greater pregnancy rate | 20.3% | 24% | 24% | 23% | 21% |

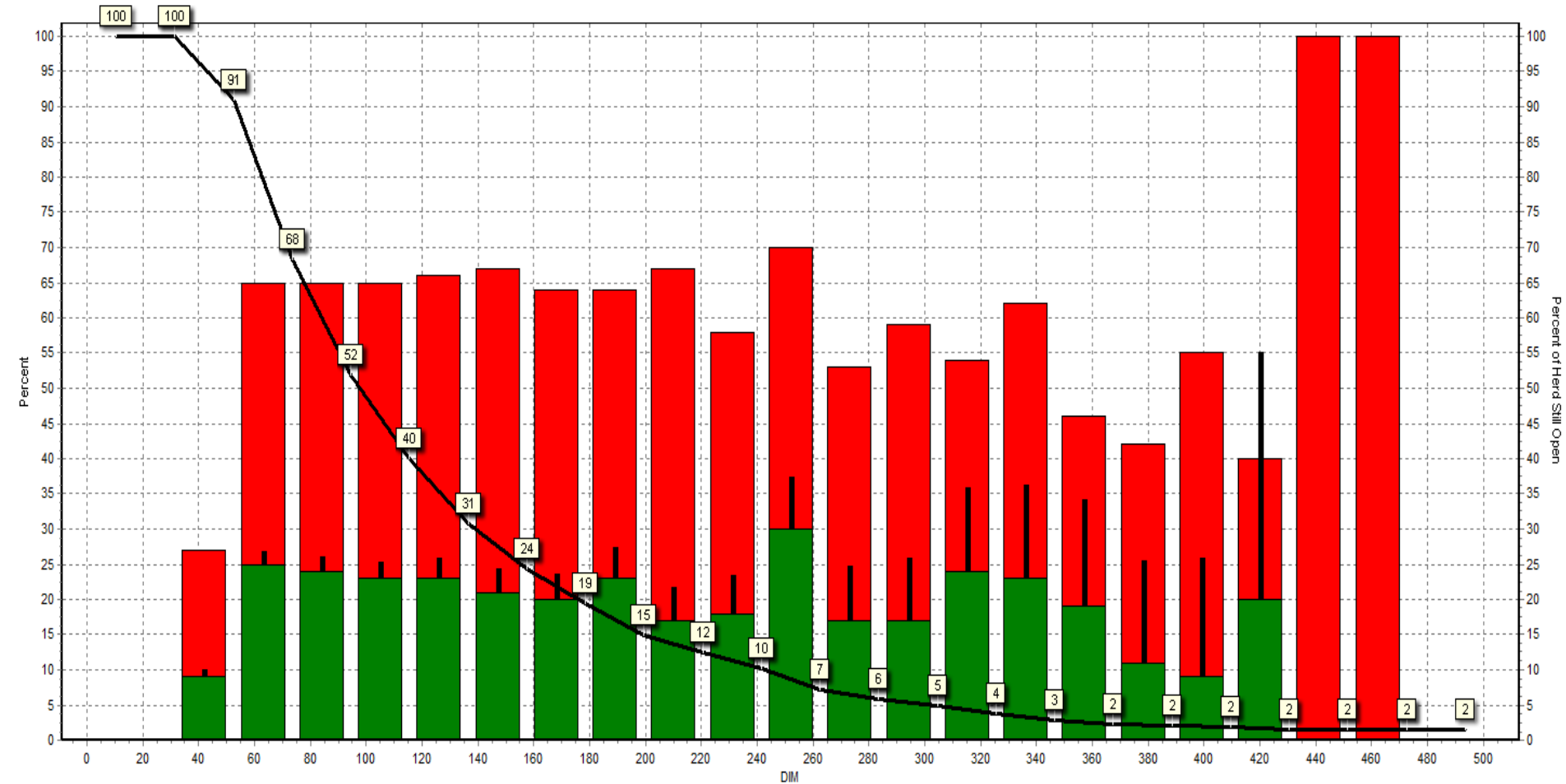
Preg Rates are good to look at and they tell an important story. BUT, getting cows pregnant early in lactation has a bigger impact on the financial statements.

怀孕率是需要关注的指标，会告诉我们重要信息，但是，让奶牛尽早怀孕对牧场效益也有重要影响。

| | Benchmark | 6/26/2015 | 1/25/2015 | 6/23/2014 | 12/4/2013 |
|--|-----------|-----------|-----------|-----------|-----------|
| Percent of herd pregnant by 150 DIM (Entire Herd) | 68% | 66% | 68% | 67% | 64% |
| Percent of herd pregnant by 150 DIM (First Lactation) | 73% | 65% | 65% | 65% | 66% |
| Percent of herd pregnant by 150 DIM (Second Lactation & Greater) | 66% | 66% | 69% | 68% | 62% |



Percent Still Open 空怀比例



Abortions the Silent Profit Killer

流产—沉默的利润杀手

| Percent Annual Abortions | | | | | |
|------------------------------|-----|-----|-----|-----|-----|
| First lactation | 12% | 14% | 15% | 14% | 14% |
| Second lactation and greater | 16% | 17% | 18% | 16% | 16% |



Cull Rates 淘汰率

| Annual Culling Analysis | Benchmark | 6/26/2015 | 1/25/2015 | 6/23/2014 | 12/4/2013 |
|-------------------------------------|------------------|------------------|------------------|------------------|------------------|
| Number cows culled | 871 | 1390 | 1373 | 1412 | 1437 |
| Percent Died | 20% | 15% | 15% | 17% | 17% |
| Percent Sold | 80% | 85% | 85% | 83% | 83% |
| Turnover rate | 39% | 43% | 43% | 45% | 46% |
| Percent death loss | 8% | 7% | 6% | 8% | 8% |
| First lactation | | | | | |
| Number culled | 233 | 411 | 445 | 456 | 442 |
| Turnover rate | 25% | 29% | 32% | 31% | 30% |
| Percent culled in first 60 days | 6% | 5% | 5% | 6% | 6% |
| Second lactation and greater | | | | | |
| Number culled | 631 | 979 | 928 | 956 | 995 |
| Turnover rate | 41% | 54% | 51% | 56% | 60% |
| Percent culled in first 60 days | 11% | 11% | 11% | 13% | 11% |



Heat Detection 发情鉴定

| Percent of Repeats: | Benchmark | 6/26/2015 | 1/25/2015 | 6/23/2014 | 12/4/2013 |
|-----------------------------------|-----------|-----------|-----------|-----------|-----------|
| 1-3 days since last service | 5% | 1% | 1% | 1% | 1% |
| 4-17 days since last service | 8% | 6% | 6% | 7% | 6% |
| 18-24 days since last service | 25% | 11% | 12% | 13% | 13% |
| 25-35 days since last service | 14% | 8% | 9% | 9% | 8% |
| 36-47 days since last service | 34% | 63% | 60% | 58% | 59% |
| >48 days since last service | 14% | 13% | 12% | 12% | 14% |
| Conception Rate of Service | | | | | |
| 1-3 days since last service | 42% | 45% | 48% | 52% | 42% |
| 4-17 days since last service | 29% | 36% | 36% | 38% | 38% |
| 18-25 days since last service | 38% | 49% | 53% | 51% | 47% |
| 25-35 days since last service | 33% | 41% | 40% | 42% | 35% |
| 36-47 days since last service | 32% | 41% | 41% | 39% | 38% |
| >48 days since last service | 32% | 30% | 30% | 31% | 32% |



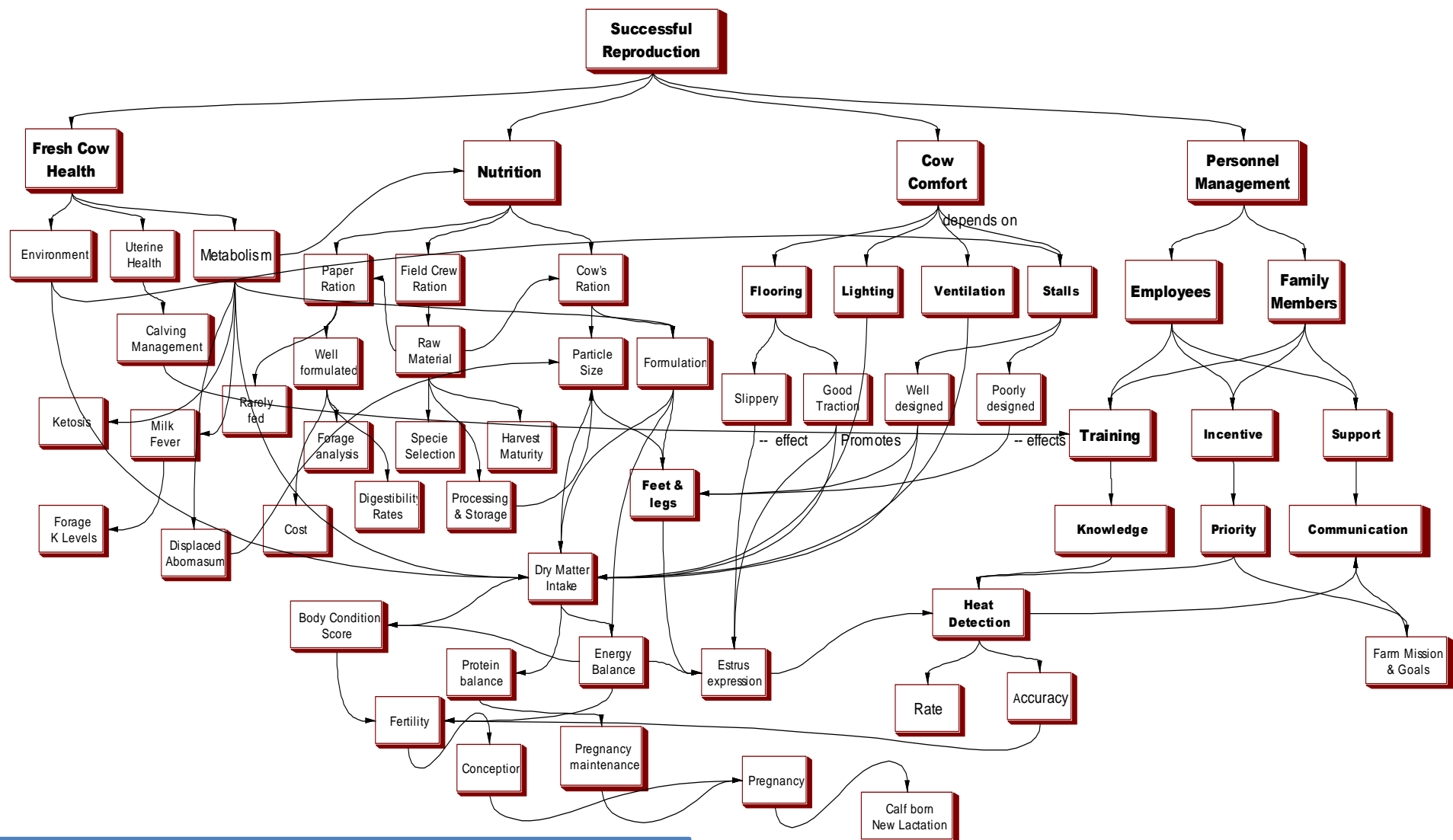
Conception Rates 受胎率

| | <u>Benchmark</u> | <u>6/26/2015</u> | <u>1/25/2015</u> | <u>6/23/2014</u> | <u>12/4/2013</u> |
|--|------------------|------------------|------------------|------------------|------------------|
| Conception rate | 36% | 39% | 40% | 40% | 38% |
| Conception rate, first service ← | 40% | 38% | 39% | 40% | 39% |
| Conception rate, second service | 36% | 41% | 42% | 41% | 39% |
| First lactation, conception rate on first service ← | 44% | 39% | 37% | 39% | 40% |
| Second lactation and greater, conception rate on first service ← | 37% | 37% | 40% | 41% | 38% |



Yes, many areas impact reproduction

是的，繁殖受很多因素影响



Key Performance Indicators

重要指标

- Fresh cow health
- 新产牛健康
- First Service Conception Rates
- 首次配种怀孕率
- Percent Pregnant by 150 Days in Milk
- 150泌乳天数的怀孕率
- Record and Benchmark your numbers
- 记录并校正你的数据



Thank You 谢谢



Nick Hemauer

CRI Int'l Technical Services Manager

