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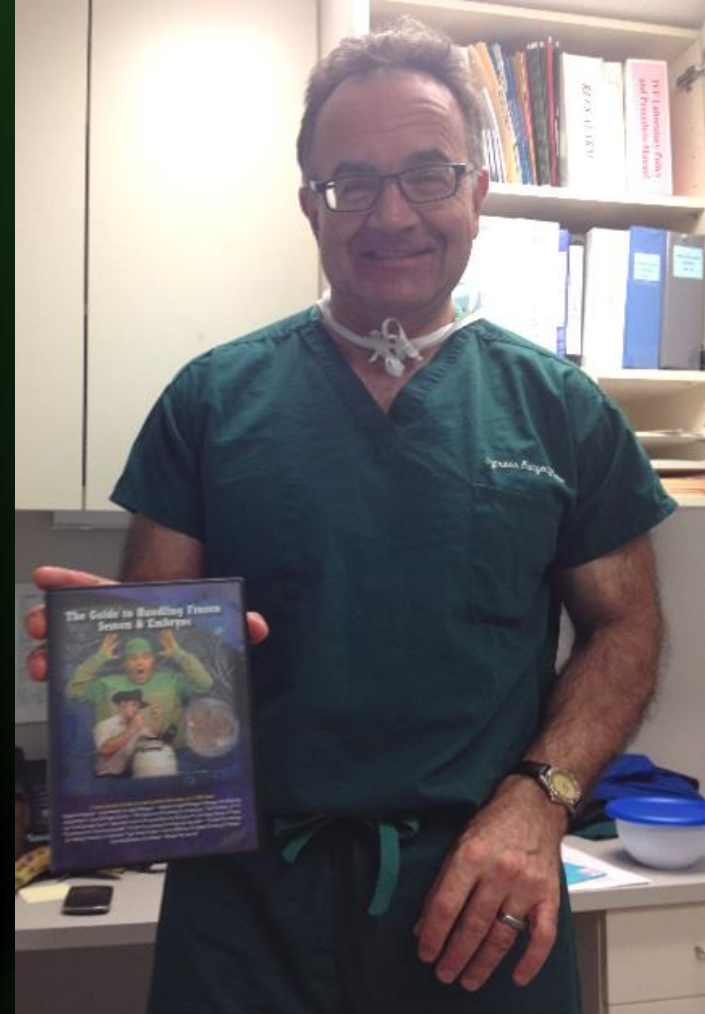
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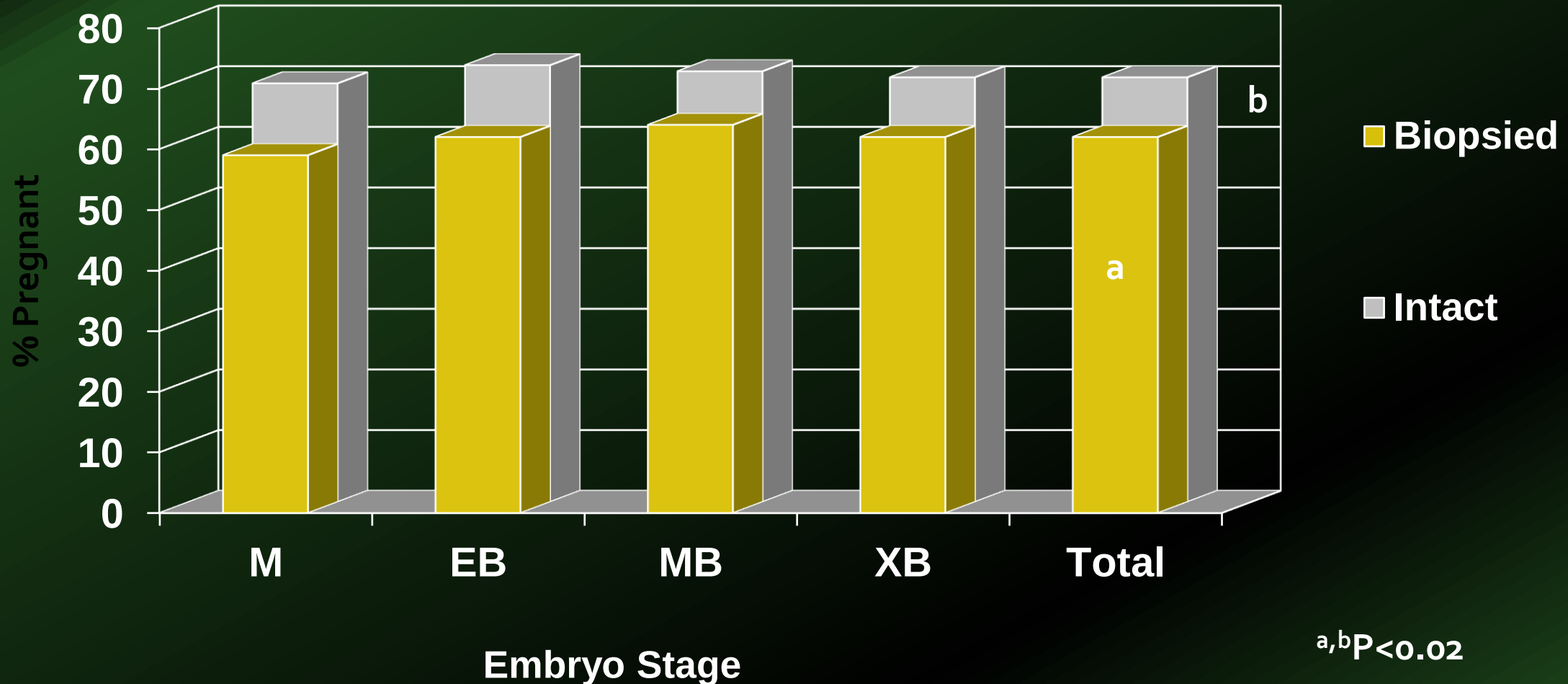
GeneSeek Genomics Symposium  
6-20-18



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# Pregnancy rates of bovine fresh in vivo intact (n = 703) versus biopsied (n = 341) embryos



$a,bP < 0.02$

(Hasler et al., 2002)

| Embryo Stage | <u>Intact Embryos</u> |                  | <u>Biopsied Embryos</u> |                  |
|--------------|-----------------------|------------------|-------------------------|------------------|
|              | No. transfer          | No. Pregnant (%) | No. transferred         | No. pregnant (%) |
| Morula       | 157                   | 114 (72.6)       | 72                      | 38 (52.8)        |
| Early blast  | 62                    | 37 (59.7)        | 60                      | 29 (48.3)        |
| Mid blast    | 52                    | 34 (65.4)        | 120                     | 64 (53.3)        |
| Expand blast | 7                     | 4 (57.1)         | 45                      | 17 (37.8)        |
| Total        | 288                   | 189 (65.6)       | 297                     | 148 (49.8)       |

**Pregnancy rates of fresh intact embryos vs. biopsied in vivo derived embryos following freezing in EG, thawing, and transfer to recipients (Grade 1 Embryos)**



# Biopsied Cells 40x Magnification



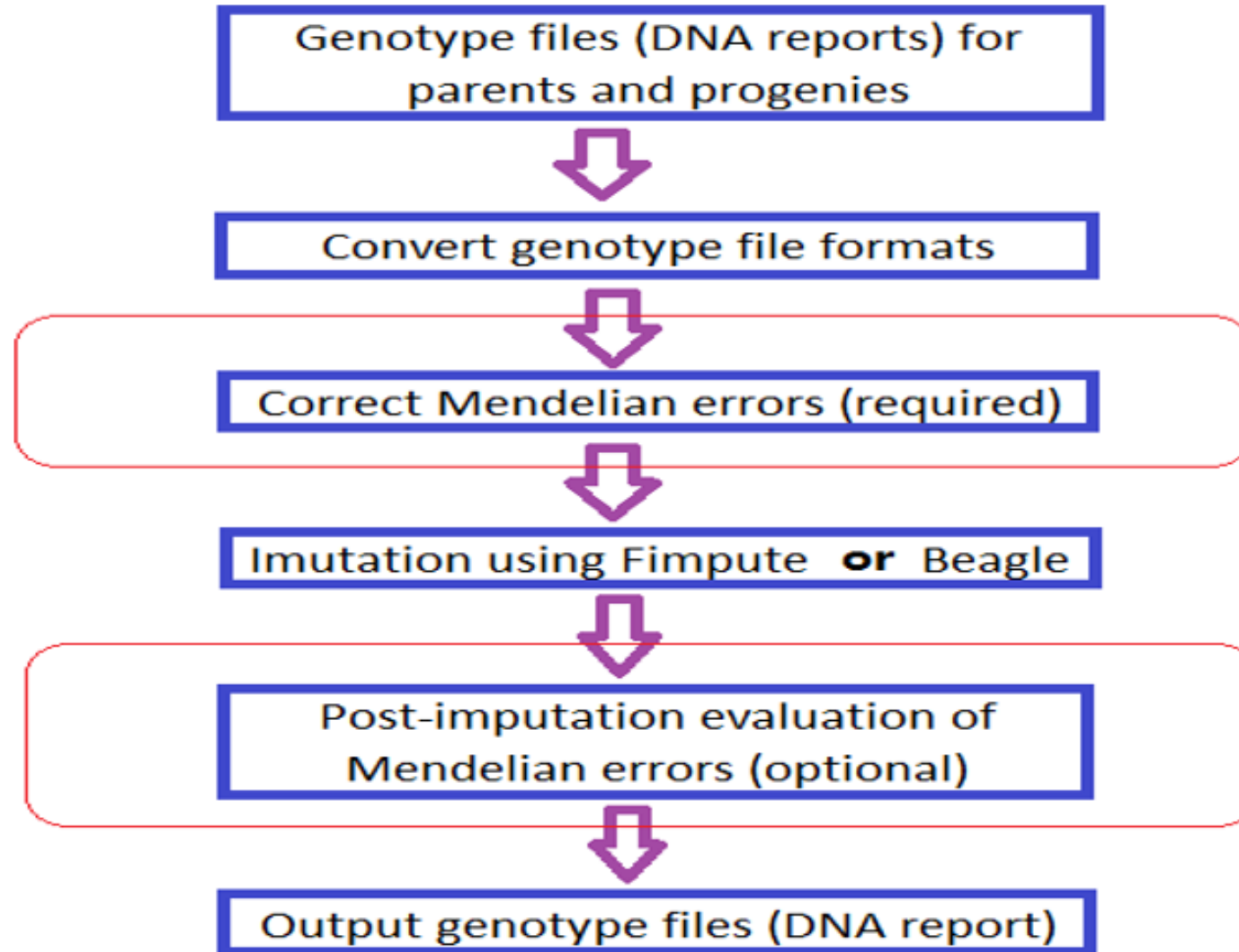
# How many cells does it take?



- Illumina needs minimum of 150ng DNA
- 1 cell can yield ~7pg DNA
- 1 biopsy yields ~70pg DNA (~10 cells)
- Cells needed to yield 150ng=2,100+



# Correcting Mendelian Errors





# Imputation Error Rates



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| Call Rate | Genotyping Error Rate |       |       |       |        |       |        |       |        |       |        |       |        |       |        |       |
|-----------|-----------------------|-------|-------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|
|           | 0%                    |       | 5%    |       | 10%    |       | 15%    |       | 20%    |       | 30%    |       | 40%    |       | 50%    |       |
|           | Mean                  | SD    | Mean  | SD    | Mean   | SD    | Mean   | SD    | Mean   | SD    | Mean   | SD    | Mean   | SD    | Mean   | SD    |
| 100%      | 0.00%                 | 0     | 5.00% | <0.01 | 10.00% | <0.01 | 15.00% | <0.01 | 20.00% | <0.01 | 30.00% | <0.01 | 40.00% | <0.01 | 50.00% | <0.01 |
| 95%       | 0.04%                 | <0.01 | 4.96% | <0.01 | 9.96%  | <0.01 | 15.04% | <0.01 | 20.15% | <0.01 | 30.35% | <0.01 | 40.36% | <0.01 | 50.22% | <0.01 |
| 90%       | 0.08%                 | <0.01 | 4.93% | <0.01 | 9.94%  | <0.01 | 15.10% | <0.01 | 20.33% | <0.01 | 30.66% | <0.01 | 40.67% | <0.01 | 50.38% | <0.01 |
| 85%       | 0.13%                 | <0.01 | 4.94% | <0.01 | 10.01% | <0.01 | 15.28% | <0.01 | 20.58% | <0.01 | 30.93% | <0.01 | 40.81% | <0.01 | 50.32% | <0.01 |
| 80%       | 0.20%                 | <0.01 | 4.92% | <0.01 | 9.97%  | <0.01 | 15.28% | <0.01 | 20.65% | <0.01 | 31.10% | <0.01 | 40.99% | <0.01 | 50.38% | <0.01 |
| 75%       | 0.28%                 | <0.01 | 4.96% | <0.01 | 10.05% | <0.01 | 15.42% | <0.01 | 20.81% | <0.01 | 31.25% | <0.01 | 41.00% | <0.01 | 50.20% | <0.01 |
| 70%       | 0.38%                 | <0.01 | 5.04% | <0.01 | 10.19% | <0.01 | 15.61% | <0.01 | 21.01% | <0.01 | 31.37% | <0.01 | 40.95% | <0.01 | 49.94% | <0.01 |
| 65%       | 0.44%                 | <0.01 | 5.26% | <0.01 | 10.64% | <0.01 | 16.19% | <0.01 | 21.61% | <0.01 | 31.77% | <0.01 | 41.06% | <0.01 | 49.71% | <0.01 |
| 60%       | 0.56%                 | <0.01 | 5.43% | <0.01 | 10.93% | <0.01 | 16.55% | 0.01  | 21.98% | 0.01  | 32.03% | <0.01 | 41.11% | <0.01 | 49.50% | <0.01 |
| 55%       | 0.69%                 | <0.01 | 5.66% | <0.01 | 11.28% | <0.01 | 16.97% | 0.01  | 22.41% | 0.01  | 32.35% | 0.01  | 41.21% | <0.01 | 49.31% | <0.01 |
| 50%       | 0.86%                 | <0.01 | 5.94% | <0.01 | 11.70% | <0.01 | 17.45% | 0.01  | 22.91% | 0.01  | 32.75% | 0.01  | 41.37% | 0.01  | 49.16% | <0.01 |

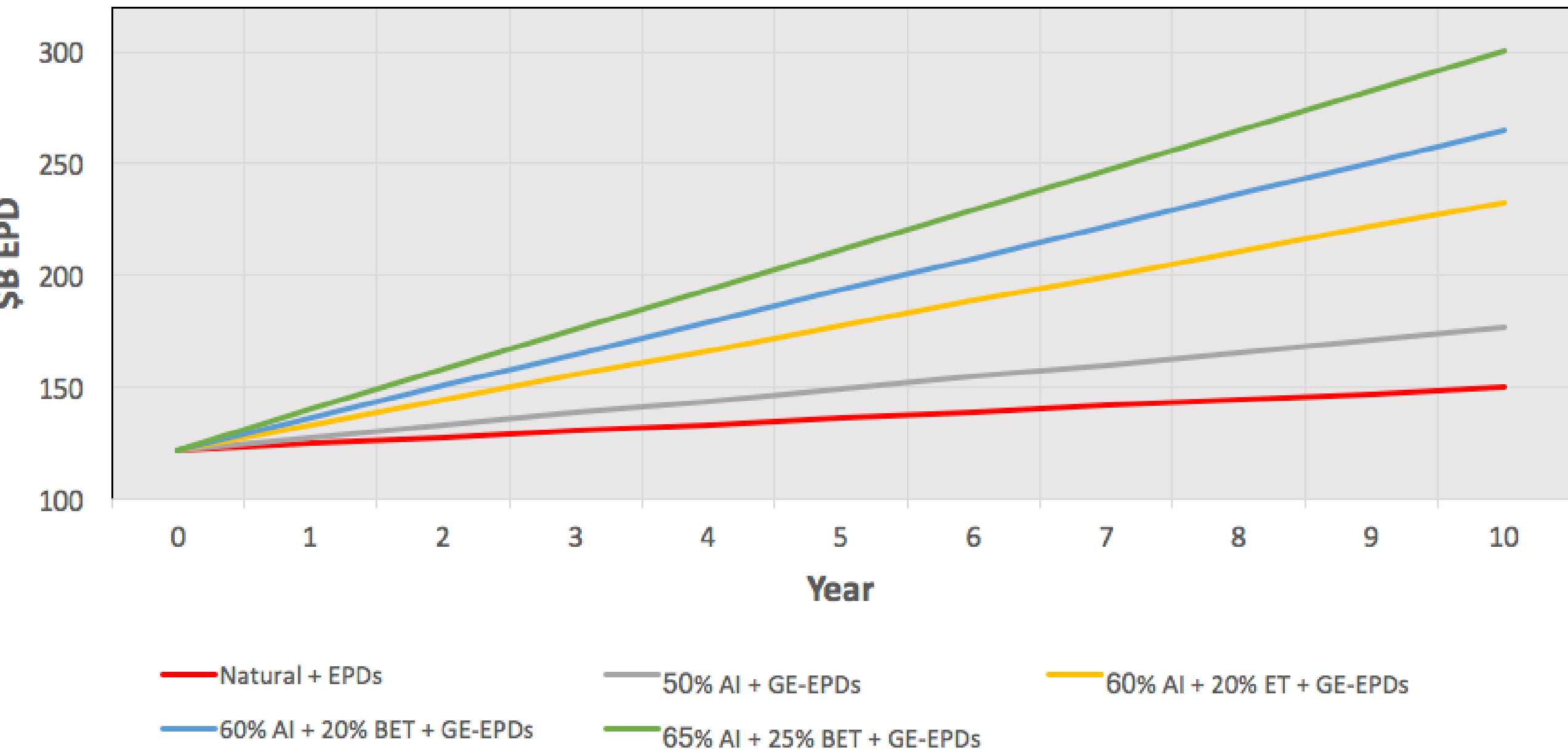


| Embryo #1 <u>Molecular Breeding Values</u> Comparison |       |       |      |      |       |       |       |      |        |      |       |       |      |      |
|-------------------------------------------------------|-------|-------|------|------|-------|-------|-------|------|--------|------|-------|-------|------|------|
|                                                       | PWADG | DOC   | HPG  | CEM  | MILK  | MW    | CW    | MARB | RIBEYE | FAT  | CED   | WW    | RADG | BW   |
| Calf @ 40,461 SNPs                                    | 0.2   | 11.51 | 2.52 | 9.31 | 22.23 | 70.97 | 47.3  | 0.63 | 0.62   | 0.05 | 10.46 | 47.07 | 0.13 | 3.07 |
| Calf @ 37,819 SNPs                                    | 0.2   | 11.13 | 2.51 | 9.44 | 22.04 | 69.79 | 46.85 | 0.62 | 0.61   | 0.06 | 10.57 | 46.8  | 0.13 | 3.06 |
| Embryo                                                | 0.23  | 10.9  | 2.52 | 8.46 | 20.9  | 68.58 | 44.73 | 0.59 | 0.61   | 0.05 | 9.4   | 44.56 | 0.13 | 3.11 |
| Embryo PE                                             | 0.19  | 11.16 | 2.58 | 9.56 | 21.77 | 72.77 | 47.33 | 0.61 | 0.62   | 0.05 | 10.43 | 47.17 | 0.13 | 3.2  |
| Embryo R50                                            | 0.2   | 10.47 | 2.6  | 8.34 | 20.53 | 66.61 | 42.64 | 0.6  | 0.59   | 0.05 | 9.77  | 42.32 | 0.12 | 2.92 |
| Embryo R75                                            | 0.21  | 10.99 | 2.59 | 8.22 | 21.02 | 70.87 | 46.61 | 0.63 | 0.63   | 0.06 | 8.7   | 47.1  | 0.12 | 3.36 |
| ΔMBV (Calf-Embryo PE)                                 | 0.01  | 0.35  | 0.06 | 0.25 | 0.46  | 1.8   | 0.03  | 0.02 | 0      | 0    | 0.03  | 0.1   | 0    | 0.13 |

| Embryo #1 Igenity 1-10 Scores |       |     |     |     |      |    |    |      |        |     |     |    |      |    |
|-------------------------------|-------|-----|-----|-----|------|----|----|------|--------|-----|-----|----|------|----|
| animID 121                    | PWADG | DOC | HPG | CEM | MILK | MW | CW | MARB | RIBEYE | FAT | CED | WW | RADG | BW |
| Calf @ 40,461 SNPs            | 6     | 5   | 6   | 7   | 6    | 6  | 8  | 7    | 8      | 6   | 7   | 8  | 6    | 6  |
| Calf @ 37,819 SNPs            | 6     | 5   | 5   | 7   | 6    | 6  | 8  | 7    | 8      | 6   | 7   | 8  | 6    | 6  |
| Embryo                        | 7     | 5   | 6   | 6   | 6    | 6  | 8  | 7    | 8      | 6   | 7   | 7  | 6    | 6  |
| Embryo PE                     | 6     | 5   | 6   | 7   | 6    | 6  | 8  | 7    | 8      | 6   | 7   | 8  | 6    | 6  |
| Embryo R50                    | 6     | 5   | 6   | 6   | 6    | 5  | 7  | 7    | 8      | 6   | 7   | 7  | 6    | 5  |
| Embryo R75                    | 6     | 5   | 6   | 6   | 6    | 6  | 8  | 7    | 8      | 7   | 6   | 8  | 6    | 6  |

PWADG: Post Weaning Average Daily Gain; DOC: Docility, HPG: Heifer Pregnancy Rate ; CEM: Calving Ease Maternal; MILK: Milk; CW: Carcass Weight; MARB: Marbling; RIBEYE: Ribeye Area; FAT: Fat Thickness; CED: Calving Ease Direct; WW: Weaning Weight; RADG: Residual Average Daily Gain; BW: Birth Weight Calling  
R50: Restricted 50%; R75: Calling Restricted 75%; PE: Embryo genotype with "Parent Enhanced" correction applied

# Potential Technology Impact on Genetic Progress





|                                | Non-Biopsy | Biopsy    |
|--------------------------------|------------|-----------|
| <b>Recipients in herd</b>      | <b>50</b>  | <b>25</b> |
| 7. Average Gross Margin/Recip  | \$1,147    | \$1,567   |
| 9. Average Gross Margin/TranEm | \$1,157    | \$1,580   |
| 11. AGMargin/Full Term ET Preg | \$2,163    | \$3,595   |
| <b>Expenses and Revenue</b>    |            |           |
| 16. Average Variable Expense   | \$133,540  | \$79,424  |
| 19. Average Total Revenue      | \$190,922  | \$118,603 |
| 20. Average Gross Margin ROI   | 42.97%     | 49.33%    |









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# Acknowledgements

❖ Jesus Christ





# Thank You!!

