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**Optimum Mainstream Crossbreeding System's "OMC Hairpin Brand  
Bell Curve Strategies"  
Including Crossbreeding and Composites for Success  
in the Cow Business**

Jim Leachman  
Leachman Cattle Co.  
Billings, Montana

INTRODUCTION

- I. PLANNING the future of your cow outfit should involve an assessment of:
  - A. PRESENT STATUS: a realistic inventory of where you are in terms of competitive production parameters, including:
    - 1. cost per pound weaned per cow exposed,
    - 2. percentage of cattle meeting carcass yield, grade, and weight specs.
  - B. PROPER GOALS: informed visions of the direction of a consumer-based market driven industry such as:
    - 1. redefining quality as a uniform product with consistent eating qualities,
    - 2. discounts for products not meeting targets and needs.
  - C. CORRECT STRATEGIES: the game plans which theoretically and practically have a good probability of realizing your goals. They are winning plans which take you from your present status to your proper goals.
- II. SUCCEEDING in the cow business (not just surviving but prospering) over the long run depends on a producer doing three things well, in harmony, and objectively:
  - A. MANAGEMENT should emphasize profit schemes.
    - 1. Define your role in the industry (see Fundamental Differences between Seedstock & Commercial Producers pg. 40).
    - 2. Be a low cost producer.
    - 3. Be a financial manager-Standard Production Analysis (SPA).
    - 4. Be an integrated resource manager-Integrated Resource Management (IRM)
  - B. MARKETING means picking your targets.
    - 1. Identify and satisfy needs.
    - 2. Produce what you can market-not market what you produce.
    - 3. Shoot for mainstream market targets or major established niches.
  - C. BREEDING (CROSSBREEDING) required a workable plan.
    - 1. Scientifically based on sound genetic and economic principles.
    - 2. Simplistic and easy to implement.

3. Systematic advanced planning of next logical steps.
4. Sustainable production where the goodness is cumulative through internal replacements.

### **This Seminar Is about Breeding Strategies**

#### **Ten OMC Hairpin Brand Bell Curve Strategies (see Facts Supporting OMC Strategies)**

- I. THE BEST STRATEGIES TO INCREASE COWHERD PRODUCTIVITY:
  - A. USE HETEROSIS (HYBRID VIGOR) to improve low heritability traits such as fertility, survivability, and thriftiness and increase pounds weaned per cow exposed 25% above the average merit of the parents. Every commercial female should be a crossbred.
  - B. USE BREED DIFFERENCES of those breeds with superior fertility since that difference can become 100% heritable when breeds are widely sampled.
  - C. USE EARLY SEXUAL MATURITY which will also improve fertility since it is a positively correlated trait that is heritable. (Seen as early puberty in heifers and testicle size in bulls.) Bulls are the main tool for accomplishing this since they can be easily measured and identified, and they exert more selection pressure and trait differentiation.
  - D. USE LOW INPUT CONVENIENCE TRAITS such as pigmentation and polledness.
  
- II. THE SOUNDEST STRATEGIES FOR ATTAINING CALVING EASE:
  - A. USE ABC'S (Across Breed Comparisons) to take into account the wide differences that exist between breeds in birth weight figures. Also, take advantage of the accuracy of utilizing these differences. On heifers, only use breeds like Angus, Salers, etc.
  - B. USE BIRTH WEIGHTS EPDs within those chosen breeds, rather than actual birth weight, as the single best indicator of Direct Calving Ease.
  - C. USE DIRECT CALVING EASE AND DAUGHTER'S CALVING EASE INFORMATION, when it is available (as it currently is with the Simmental and Gelbvieh breeds) based on objective data from heifers (cow data does not differentiate calving difficulty).
  - D. AVOID SUBJECTIVE AND LESS CORRELATED DATA such as shape of the bull or calf, gestation, and pelvic area. Pelvic area is mainly correlated with frame and is

probably a threshold trait with only the really small pelvic areas being related to calving difficulty (those animals should be culled).

- E. HAVE REALISTIC SPECS FOR CALVING EASE BULLS. Unrealistically, all cowmen want a calving ease bull for heifers who is big and good and whose calves really grow. The soundest strategies for a first calf heifer, calving ease bull's specs are as follows:
1. Low birth weight as indicated by EPDs and ABCs for problem free calving and future productivity of the heifers.
  2. High maternal EPDs so the resulting heifer calves can be kept as replacements. These heifers represent the latest genetic turnover (see Genetic Progress Formula on page 41) and are often born earlier than those out of the cow herd. Also, low birth good milk are not negatively correlated which makes this combination easy to procure.
  3. Modest growth and moderate frame so that part of the strategy on these bulls and their daughters is to be an annual readjustment back to mainstream size rather than escalating mature cow size often found in performance oriented programs.

### III. THE CHEAPEST, QUICKEST, MOST ACCURATE STRATEGY FOR IMPROVING GROWTH AND YIELD IS TO USE THE SUPERIOR ABCs OF CONTINENTAL BREEDS.

- A. These differences are large and usually greater between breed types than within any given breed.
- B. Again, these breed differences are 100% heritable when breeds are properly sampled.
- C. Growth, muscle, and leanness by themselves are easy to find, easy to get, and thus not worth a premium price. It is only when balanced with harder to get, superior, maternal production traits and carcass quality, that they should command a premium.
- D. Among the Continental breeds, there are some which grow and yield nearly as well as the "terminal" breeds but which also have early sexual maturity, fertility, milk, and intermediate carcass quality (e.g. Simmental, Gelbvieh, Tarentaise, Salers, etc.). Use moderate, modified versions of only this type of Continental breed.

### IV. USE BULLS AS THE PRIMARY STRATEGY FOR GENETIC CHANGE, ESPECIALLY IN COMMERCIAL HERDS.

- A. REASONS:
1. Over three generations, bulls account for 87% of the genetic variation in a herd.
  2. In the formula for genetic progress, bulls have decidedly greater influence through
    - a. Greater differential superiority (the difference between the bulls genetic merit and the average genetic merit of the herd) over herd average
    - b. Greater selection intensity (select a smaller percentage of bulls--can cull more)

- c. Greater generation turnover (average age of bulls is lower, change more often)
- 3. The only time you have selection pressure on females is when you buy them. Thereafter, it is not economical to turn them over because culling takes away most of the selection pressure leaving just enough females to maintain herd size.

B. STRATEGIES:

1. Select bulls whose progeny will match the market when mated to your cows. Your cows should already be matched to the environment.
2. Maximize your selection pressure by using objective measurements and probabilities and disregarding incidental costs such as transportation.
  - a. commercial breeders should use tested "herd bull quality" professional bulls with real genetic differences,
  - b. seedstock breeders should use AI and AI quality bulls.
3. Use breed differences as indicated by ABCs for most accurate and efficient source of traits needed.
4. Use EPDs for within breed, between herd selections because:
  - a. EPDs incorporate all data we have available for any given trait.
  - b. EPDs are nine times more accurate than selection between herds based on adjusted weights and ratios, even for low accuracy sires.
  - c. Use indexes for disciplined multiple trait selection (see pg. 11 point V.D.) or set independent culling/selection criteria for each trait.
5. Use the power of Professional Bulls and Professional Breeders.
  - a. Buy bulls from documented genetics that are compared objectively and treated equally in large contemporary groups. You can only take home genetics, not management and environmental differences.
  - b. Buy bulls from a program where the objective genetic and average bull is to your liking because that is most likely what you will get.
  - c. Buy bulls from legitimate breeders with proven, established integrity, guarantees, reputation and staying power.

V. RISK MANAGEMENT STRATEGIES FOR BULL SELECTION SHOULD BE BASED ON STATISTICAL PROBABILITIES NOT COWBOY LOGIC.

- A. SPREAD RISK on young, unproven, low accuracy bulls by:
  1. sampling multiple bulls with the same level EPDs within a breed. The result will be that the herd will move in the direction of the average EPDs or breed average or properly sampled bulls. Play the odds using EPDs, even on low accuracy bulls;
  2. sampling bulls whose expected change (expected standard deviation for that level of accuracy) for a trait is within the accepted minimum/maximum level of acceptability, should he change. With low accuracy bulls, don't drive too close to the edge.
- B. MINIMIZE RISK for critical traits by using proven, high accuracy bulls whose expected change is small and well within acceptable levels. Only with proven bulls can you use EPD levels close to your comfort zone.

- C. MINIMIZE MAJOR CHANGES OR CORRECTIONS by using proven bulls with the most deviation from the average, i.e. trait leaders.
  1. Variation is the only tool available in selection. It is an opportunity not a problem. It is the fuel for change.
  2. You should hunt for Trait Leader trophies in proven trophy hunting grounds.
  3. The mating of opposites, using the above strategies, does work to create dependable intermediates.
  
- D. OUTLIERS, especially those which combine antagonist (negatively correlated) traits:
  1. are few and far between
  2. can only be found using lots of records in lots of herds,
  3. usually come from gene pools which have existing divergent variation (i.e. low birth, high growth).
  
- VI. THE SOUNDEST STRATEGIES FOR A COW HERD ARE FOR DECISIONS TO BE ECONOMICALLY DRIVEN, NOT GENETICALLY DRIVEN.
  - A. The formula for genetic progress shows that there is little you can do with the cows, compared to bulls. As a commercial producer, you don't have to ID, weigh, and performance test because you can inherit all that with the bulls you buy. Just be sure your bull producer does it.
  
  - B. Select only for adaptation of cows to your environment and management schemes as evidenced by their reproductive success-breeding and calving percentages, body condition scores, etc. (In composite breeding theory, the strategy is to plug breed differences in to hit equilibrium levels of performance. One only makes minor adjustments in order to hit the target. Selection is mainly for adaptation.)
  
  - C. Cull only by exception. The herd has to be problem free enough to ensure that normal culling for opens, age, defects, and poor calving still allows for herd size maintenance or expansion. Normally, there is no room for any meaningful selection pressure for other criteria. So, the culling criteria should be as simple and objective as possible. For example, use a scoring system of good, average and poor (cull) for udder, disposition, etc. More detailed delimiters are usually arbitrary and useless.
  
- VII. USE CORRELATED TRAITS OF FRAME AND BIRTH TO PREDICT MATURE SIZE AND MARKET WEIGHTS. Useful rules of thumb are:
  - A.  $(\text{Missouri Frame Score} \times 100) + 650 = \text{Market Weight of Steer of acceptable grade and yield. } 5.5 \text{ frame equals a } 1200\text{lb. steer.}$
  
  - B.  $\text{Mature Weight of Cows} = \text{Market Weight of her steers when she is mated to like bulls.}$
  
  - C. Yearling frame is also a useful early indicator of mature size.

- D. Twenty years ago we said it takes 85lb. birth weight cattle (the average of both sex calves within their expected bell curve distributions) to hit market targets. It still looks right today. With the high correlation between birth weight and mature weight, we feel that as soon as a calf is born we have a 5-year early prediction on mature size. By putting downward pressure on birth weight while still maintaining upward pressure on growth, we are stabilizing frame size and mature size.

VIII. THE SAFEST BREEDING TARGET STRATEGIES ARE TO AIM AT MAINSTREAM TARGETS because:

- A. All traits spread over a bell curve distribution and most smaller niche markets can be filled by regular mainstream production (three standard deviations around the mean). Also, not everyone has access to niche markets.
- B. The problem with aiming for a niche is that part of the production is entirely off the paper in terms of practicality, acceptability or usefulness. The goal has to be to get the most product within the bull's eye, in the grid, or within the specs.
- C. When evaluating how close to the target a product is, one must take into account the differences between females and males for all the traits. If one sex is exactly in the middle of the grid, the other maybe off the paper. For example, carcass weight and yield differs greatly between heifers and bulls.

IX. THE MOST WORKABLE STRATEGIES FOR STABILIZING A CROSSBREEDING PROGRAM IS THE LONG RUN OMC EVOLUTION OF BREEDING SCHEMES. OMC PRINCIPLES ARE:

- A. A workable crossbreeding program should be simple, scientific, systematic and sustainable.
- B. The goal is equilibrium - efficient duplication of predictable, uniform products.
- C. Use only breeds with early sexual maturity and strong maternal characteristics. There are breed choices which can do this and still grow and yield right with the best terminal breeds.
- D. Use modified, moderate, phenotypic look-a-likes for compatibility and interchangeability of parts.
- E. **Here is the suggested OMC evolution:**
  - 1. Use Angus if:
    - a. it's not already in the herd,
    - b. carcass quality is needed,
    - c. production convenience traits are needed,
    - d. there is a need to "unscramble" a mixed bag of cattle.

2. Use Purebreds (7/8 or better) to create INTERMEDIATE CROSSBREDS and keep the crossbred females. Use breed differences to form a complementary mix of breeds:
  - a. English breeds such as Angus (Red & Black) South Devon for attributes including :
    1. marbling and tenderness,
    2. convenience traits including fleshing ability,
    3. moderate mature size.
  - b. Continental breeds such as Gelbvieh, Simmental, Salers and Tarentaise for attributes including:
    1. high yield or muscle to fat ratio,
    2. growth,
    3. milking ability,
  - c. Use Bos Indicus when heat adaptation/tick resistance is required.
    1. Combine with English breeds to improve carcass eating quality and reproduction while maintaining fleshing ability.
    2. Add Continental when muscling/lean required.
3. Stabilize the ideal Intermediate blend by using hybrids (1/2 and 3/4 English/Continental blends) created by AI from known breed EPD and ABC gene pools. This hybrid approach duplicates the first successful crossbred and avoids wide swings in type that would result from the continued use of purebreds.
4. Retained optimum levels of heterosis by continuing to use hybrid with at least one unrelated parent breed or evolve to composite breeds of 3 or more components.

Note that using steps 3 and 4 ensures:

- a. retained heterosis levels of 50%-75%, compared to an F<sub>1</sub> cross.
- b. less variation. 2/3 of the progeny produced are within one standard deviation of the optimum (in the mainstream, in the target area) as compared to two breed, purebred rotational crossing systems where 1/2 the progeny are more than one standard deviation outside the optimum.
- c. simple, single breed, single pasture crossbreeding.
5. The ultimate in simplicity, retained heterosis, and uniformity is crossing different composites with the potential of 80% - 90% of the heterosis of and F<sub>1</sub> permanently maintaining a 20% increase in pounds weaned per cow exposed.

X. THE BEST STRATEGY TO PROTECT YOUR BREEDING PROGRAM IS TO BE PROFITABLE, ENVIRONMENTALLY SOUND, POLITICALLY CORRECT, AND SOCIALLY ACCEPTABLE.

- A. Support and use organizations such as NCA, MSGA, and other trade groups to endure and secure your future.
- B. Form alliances with those who have common interests infiltrate those who do not.

## CONCLUSION

### A. THE SUCCESSFUL CATTLE PRODUCER OF THE 21ST CENTURY WILL

1. Balance management, marketing and genetics.
2. Use objective measures in each of these areas.
3. Make decisions based on probability schemes.
4. Use modern breeding techniques.

### B. REMEMBER,

"Imperfect people use imperfect cattle and imperfect knowledge to build better cattle and a better world."

-Jim Leachman

**OMC  
FUNDAMENTAL DIFFERENCES  
BETWEEN COMMERCIAL AND SEEDSTOCK HERDS**

**DEFINE YOUR ROLE IN THE INDUSTRY**

SEEDSTOCK

vs.

COMMERCIAL

CHARACTERISTICS

Nucleus/Tool and Die  
Genetically Driven  
Differentiated/Brand Products  
Intensive Management  
Proportionately Small  
Size Based on Demand  
Manage risk  
Longer Range Goals

Multiplier/Factor  
Economically Driven  
Homogenous/Commodity Products  
Extensive Management  
Proportionately Large  
Size Based on Carrying Capacity  
Minimize Risk  
Shorter Range Goals

MARKET TARGETS

Commercial Breeder Needs  
Niches/Specialization

Market & Production Needs  
Mainstream

GENETIC TOOLS

Variation  
Heritability  
Selection Pressure  
Correlated Responses/Indexes  
Generation Turn-over  
Artificial Insemination

Breed Differences  
Heterosis  
Culling by Exception  
Correlated Responses/Indexes  
Yearling/Young Bulls  
Professional Bull Power

GENETIC GOALS

Predictable Change  
Lead-time  
Outliers

Predictable Duplication  
Equilibrium  
Optimums

MEASURES OF SUCCESS

Profitability  
Genetic Performance Differences  
Intrinsic Breeding Value  
Reputation for Integrity  
Industry Status & Position  
Premiums

Profitability  
Actual Performance Differences  
Market Value for Consumption  
Reputation for Uniformity  
Market Acceptance  
Lack of Discounts

CHOICE OF PRODUCTION AND BIOLOGICAL TYPES

<u>CLASSIFICATION</u>	<u>TYPES</u>	<u>CLIMATE</u>	<u>CARCASS</u>
Purebred (7/8+)	Calving Ease,	Temperature	High Quality,
Hybrid F1 or F2,	Multi-Purpose,	or	Mainstream,or
Composite      Terminal	Heat Tolerant	High Lean	

## FACTS SUPPORTING OMC STRATEGIES

### I. The Genetic Formula for Progress:

$$\text{Genetic Progress} = \frac{\text{Genetic Variation} \times \text{Selection Intensity} \times \text{Heritability}}{\text{Generation Interval} \times \text{Number of Traits}}$$

### II. Facts About EPD's:

- A. EPD selection is nine times as effective as selection with simple ratios
- B. EPDs account for differences in environment and management found between herds, unless contemporary groups are misrepresented.

### III. Facts About Breeding Up:

7/8 and higher percentage animals can be considered purebreds since they will be homozygous and predictable for breed traits.

### IV. Facts About Correlated Traits:

- A. Correlated traits and general trend found in populations of cattle. If you select for a single trait, the correlated traits are likely to change as well in a positive or negative direction as indicated. Antagonistic traits are traits where the correlation tends to improve one trait at the expense of the other trait.
- B. Positively Correlated Traits (if increasing one, the other is likely to increase)
  - 1. Birth Weight and Growth
  - 2. Growth and Mature Size
  - 3. Mature Size and Maintenance Energy Requirements
  - 4. Milk Production and Maintenance Energy Requirements
  - 5. Marbling and Fleshing Ability
  - 6. Early Sexual Maturity And Fertility
- C. Negatively Correlated Traits (if increasing one, the other is likely to decrease)
  - 1. Growth and Calving Ease
  - 2. Marbling and Yield
  - 3. Growth and Milk

### V. Facts About Multiple Trait Selection:

- A. Genetic progress decreases with each additional trait used in selection.
- B. Effective multiple trait selection requires a great deal of selection intensity (i.e. the ability to pick from a large number of animals and accurate data describing the trait in question).
- C. Index Selection allows the weighting of different traits to simplify multiple trait selection. Indexing is an effective tool for genetic progress.
- D. It is possible to make progress on two antagonistic traits simultaneously if discipline is used. Over a 14 year trial, Montana State researchers were able to decrease birth weight EPDs by .8 kg while increasing weaning and yearling EPDs by 15.3 and 25.5 kg respectively in a population of purebred Hereford Cattle.