

Health Management of Replacement Heifers

D. Owen Rae, DVM

College of Veterinary Medicine
University of Florida, Gainesville

Female Herd Replacements

The goal of the producer raising replacement heifers is to economically convert nursing heifer calves into productive brood cows (a quote from Bob Sand). The replacement rate in a herd should be between 15 to 20% annually. Replacement heifers should be raised on-ranch in most cases. These heifers are adapted to ranch management and environment. They are of a known genetic background and a known health background.

The traits most desired in the replacement heifer follow:

- ▶ Potential for growth and early puberty (puberty by 13 to 14 months of age)
- ▶ Fertility (pregnant within the first 25 days of breeding season, and able to breed back at age 2 within 45 days)
- ▶ Calving ease (critical: able to produce a live calf, with little difficulty)
- ▶ Good mothering traits and milk production (able to raise a calf to average or above-average weaning weight, or near 40% of her mature weight)
- ▶ Soundness (longevity: able to produce a calf every year for 6 to 9 years)
- ▶ Good temperament (you can work with her in your management system)
- ▶ Low maintenance requirements (a low demand on supplemental resources)

Note: In the commercial herd it's tough to balance maternal and production traits.

Tools. The tools available to develop the desired replacement heifer include nutrition, health care (products and practices), genetics (i.e., expected progeny differences or EPDs, and DNA-testing), and management technology. **Management technologies** are tools that can be used to measure performance of the heifer—traits such as weight, hip height, body condition score (BCS), reproductive tract score (RTS), and pelvic measurement.

A Logical Approach. We will examine the specific health needs of the heifer through the developmental process. Development begins with sire selection; selection is based on expected progeny differences, breeding soundness evaluations, and other sound selection criteria and tools. Thereafter, heifer development should be evaluated through the following phases:

- (1) pre-weaning
- (2) weaning-to-breeding
- (3) breeding-to-calving
- (4) calving-to-rebreeding

Recognizing Threats to Heifer Health

Potential disease challenges (Richey, 1992), or threats to the developing beef heifer, are summarized in Table 1. Once identified, these challenges can be categorized as to how potential challenges might affect the heifer. Will the challenge be to the survival of the animal, her reproductive or fetal well-being, her offspring, or will it be a source of reduced herd performance?

Threats to the survival and development of the heifer are conditions that might lead to death, retarded growth, or impaired performance. Condi-

tions affecting reproduction and fetal development impair reproductive performance and place the fetus at risk. Other conditions may pose a threat to the newborn offspring; protection of newborns can be provided by fortification of the heifers' colostrum, or first milk. By recognizing these general threats or challenges—which can produce both overt and subclinical herd disease—a plan can be established to create herd disease barriers.

As a producer and veterinarian work together to identify a ranch-specific list of disease challenges or threats, consideration must be given to specific characteristics of the existing management, environment, and genetics. Disease challenges included in our discussion of heifer health management are listed in Table 2. This list can also be considered our “subclinical herd disease” threats or our “barrier of protection” category.

For each of our developmental phases, we will categorize the disease challenge specific to that developmental period, identifying *when* the disease challenge is most likely to exist and addressing methods by which protection and prevention can be conferred.

I. The Heifer Calf (sample protocol)

A. Calving Season

1. obstetrical management
2. disease challenge? (Table 3)
 - a. scours
 - b. pneumonia
 - c. umbilical infection
 - d. septicemia
 - e. miscellaneous challenges
 - (1) hernias
 - (2) abomasal ulcers
 - (3) congenital defects
 - (4) predation/accidents
3. disease management
 - a. reduce exposure
 - b. specific/nonspecific protection

- (1) colostrum
 - (2) good husbandry
 - (3) immunization of dam and(or)
 - (4) immunization of newborn
 4. immunization
 - a. clostridial agents
 - b. IBR (IN)
 5. therapy (“last-ditch” response)
- #### **B. Nursing Calf Management**
1. dehorning, branding
 2. immunization, implanting
 3. growth-promoting implants
 - a. non-breeding calves?
 - b. advantages:
 - (1) improved growth rate
 - (2) increased feed efficiency
 - c. disadvantage:
adverse reproductive effect is possible
 - d. Synovex C approved
heifers over 45 days of age
 - e. Ralgro
once in heifers over 60 days of age
 4. creep feed?
 - a. supplemental energy/protein
(≥10%)
 - b. feed on-farm feedstuffs
 5. immunization (4 to 6 months)
 - a. clostridial agents
 - b. respiratory disease agents
 - c. brucella (heifers only)
 - d. IBK (pinkeye)?
- #### **C. Pre-Weaning/Weaning Management**
1. disease challenge?
 2. immunization (boosters)
 - a. clostridial agents
 - b. respiratory disease agents
 - c. leptospira
 - d. campylobacter
 3. parasite control
 - a. external parasites
(grub, lice, mite, fly control)
 - b. internal parasite control

**II. The Replacement Heifer:
Weaning-to-Breeding (sample protocol)**

A. Weaning–Selection

1. maintain records (identification important)
2. keep 100 to 150% of desired replacements
3. selection criteria
 - a. feed efficiency and growth potential
 - b. reproductive efficiency, fertility
 - c. calving ease
 - d. maternal traits
 - e. genetic traits
 - (1) soundness
 - (2) temperament
 - f. disease resistance
 - g. low maintenance requirements

B. Heifer Nutrition

1. supplemental feeds/concentrates; feed to gain at:
 - a. 1.2 to 1.5 lb/d during early development
 - b. ≥ 1.5 lb/d prior to and through breeding
2. feed additives/supplements?
 - a. ionophores
 - b. feed-grade antibiotics
3. monitor body condition (BCS)
4. monitor target weights
 - a. 65% of mature body weight at breeding
 - b. 85% of mature body weight at calving
5. avoid plant and chemical toxins (heifers are inquisitive and susceptible)

C. Pre-Breeding (45 to 60 days)

1. disease challenge? (Table 4)
 - a. venereal and reproductive diseases
2. immunization
 - a. vibrio (*C. fetus venerealis*)
 - b. leptospira (5 serovars)

- c. trichomonas (*T. fetus*)?
- d. IBR, BVD
3. parasite control
 - a. external parasites (grub, lice, mite, fly control)
 - b. internal parasite control
4. measuring age at puberty? (weight, BCS, RTS, hormonal assay)
5. reproductive tract evaluation (RTS)
 - 1 = infantile tract (small toneless uterus, small ovaries)
 - 2 = closer to cycling (slightly larger uterus, small follicles)
 - 3 = on the verge of cycling (some uterine tone, follicles present)
 - 4 = presumed cycling (good tone, size, follicles, no CLs)
 - 5 = cycling (similar to 4, but a CL is palpable)
6. utilization of RTS (Tables 5 and 6)
7. pelvic-area evaluation
 - a. varies from herd to herd
 - b. depends on heifer size (140 to 170 cm²)
 - c. culling tool; *not a selection tool*
 - d. cull low end (5 to 15% of animals with smallest pelvic areas)
8. cull heifers not meeting pre-breeding selection criteria

D. Breeding Season

1. 2 to 3 weeks before cows
2. should be gaining weight (avoid over-feeding)
3. select bulls carefully
 - a. calving ease essential
 - b. utilize EPDs, BSE, scrotal circumference
4. 45-day breeding period
 - a. 60- to 75-day calving season
 - b. calves more uniform
 - c. management simplified
 - d. nutrients more uniformly available

5. estrous synchronization (optional tool)
6. artificial insemination (optional tool)

**III. The Replacement Heifer:
Breeding-to-Calving (sample protocol)**

A. Disease Challenge? (Table 7)

B. Post-Breeding

1. pregnancy exam
 - a. 50 to 80 days post-breeding
 - b. non-pregnant?
 - (1) trichomonas
 - (2) campylobacter
 - (3) nutrition
 - c. cull non-pregnant or place them in a separately managed group
2. selection
 - a. early breeders
 - b. negative disease history
 - c. desirable conformation, color, etc.

C. Wintering/Pre-Calving

1. maintain body condition
 - a. keep separate from mature cow herd
 - b. adequate nutrition essential
 - c. feed to gain ≥ 1 lb/hd/d
 - d. supplementation necessary, especially if losing body condition
2. pre-partum immunization (30 days prior to start of calving season)
 - a. clostridial agents (7- or 8-way)
 - b. *E. coli* (rota, corona)
 - c. respiratory disease agents (3 to 6)
 - d. booster vaccination required!

D. Calving Season

1. move heifers to calving area
 - a. closely observe calving area (time?)
 - b. good visibility
 - c. dirt- or grass-based
 - d. minimum of holes or water
 - e. sheltered pasture (well drained)

- f. mothering-up area
2. obstetrical readiness (supplies on hand and facilities ready)
3. heifer care
 - a. obstetrical mandate:
cleanliness and lubrication
 - b. encourage heifer to stand
 - (1) within one-half hour
 - (2) avoids uterine prolapse
 - (3) allows assessment of nerve damage
 - c. check udder
 - (1) swollen teats
 - (2) mastitis
 - (3) edema
 - d. retained placenta
 - (1) >12 hours following delivery
 - (2) forceful removal is *not* necessary
 - (3) antibiotics needed only if sick
4. calf care
 - a. check respiration
 - b. clean mucous from nostrils and mouth
 - c. stimulate calf by rubbing skin
 - d. insure colostrum consumption (within 2 to 4 hr)
 - e. treat umbilical cord
 - (1) 7% tincture of iodine
 - (2) pour into and over stump
 - f. check for birth defects
 - (1) cleft palate
 - (2) leg problems, etc.
 - g. identify and weigh
 - h. special therapy
 - (1) vitamin injections (A, D, E, Se)
 - (2) immunization
 - (a) *E. coli*, rota/corona virus
 - (b) *Cl. perfringens* C&D toxoid
 - (c) antitoxins
 - (d) monoclonal antibodies

IV. The Replacement Heifer: Calving-to-Rebreeding (sample protocol)

- A. Disease challenge? (Table 8)
- B. Note:
 - 1. The heifer is approaching maturity
 - 2. But she is not there yet
 - 3. Rebreeding is critical to her long-term success!
- C. Post-calving/Pre-breeding
 - 1. monitor health
 - a. general well-being
 - b. body condition
 - c. reproductive tract
 - 2. nutrition
 - a. still growing
 - b. lactating
 - c. healing from past pregnancy
 - 3. immunization (booster)
 - a. vibrio (*C. fetus venerealis*)
 - b. leptospira (5 serovars)
 - c. trichomonas (*T. fetus*)?
 - d. IBR, BVD
 - 4. parasite control
 - a. external parasites
(grub, lice, mite, fly control)
 - b. internal parasite control
- D. Breeding Season
 - 1. pregnancy early in breeding season
 - 2. prepare heifer to join mature cows

Alternate Practices

This is the description of an idealized health management protocol. Design of a protocol must

be made within the context of the environment, management philosophy, and type(s) of cattle on a ranch. A producer best utilizes his resources when a plan is carefully designed by the producer and a veterinarian familiar with the ranch. Identification of risks, evaluation of times of potential challenge, selection of management strategies, and timing can better be fitted to specific circumstances. Keep in mind that, unlike cows, heifers need much closer, more intensive care. It is especially important in the replacement heifer herd that we avoid extended breeding seasons or year-round breeding seasons.

Conclusion

Heifer development is critical to the success of the cow-calf enterprise. Attention to heifer health as part of an overall heifer development program is essential to success. Challenges to heifer health and reproductive well-being must be evaluated, beginning with bull selection prior to their conception, during their neonatal and growing period and through breeding, gestation, calving, and rebreeding for the second time.

References

- Richey, E.J. 1992. Keep livestock health simple and make it fit the beef cattle operation! IFAS Extension Circular No. 1038.
- Andersen, K.J., D.G. LeFever, J.S. Brinks, and K.G. Odde. 1991. The use of reproductive tract scoring in beef heifers. *Agri-Practice*. 12:19–26.
- Corah, L.R. 1991. Replacement heifer development. *The Bovine Proceedings*. 23:81–84.

Table 1. Agents that can potentially challenge the developing heifer

Agent	Disease Name	Agent	Disease Name
<i>Bovine Herpes 1</i>	infectious bovine rhinotracheitis (IBR)	<i>Anaplasma spp.</i>	anaplasmosis
<i>Pestivirus Togaviridae</i>	bovine virus diarrhea (BVD)	<i>Campylobacter fetus</i>	vibriosis/ campylobacterosis
<i>Parainfluenza virus</i>	parainfluenza 3 (PI3)	<i>Trichomonas fetus</i>	trichomoniasis
<i>Syncytial virus</i>	bovine respiratory syncytial virus (BRSV)	<i>Brucella abortus</i>	brucellosis
<i>Hemophilus somnus</i>	hemophilus pneumonia; TEM	<i>E. coli</i>	<i>E. coli</i> scours
<i>Clostridium spp.</i>	blackleg (<i>Cl. chauvei</i>) malignant edema (<i>Cl. septicum</i>) blacks disease (<i>Cl. novyi</i>) sordelliosis (<i>Cl. sordelli</i>) overeating disease (<i>Cl. perfringens D</i>) enterotoxemia (<i>Cl. perfringens C</i>) enterotoxemia (<i>Cl. perfringens B</i>) redwater (<i>Cl. hemolyticum</i>)	<i>Rotavirus</i>	calf scours
		<i>Coronavirus</i>	calf scours
		<i>Hemonchus spp.</i>	barber pole worm
		<i>Ostertagia spp.</i>	brown stomach worm
		roundworms	G.I. parasites
<i>Leptospira</i>	<i>hardjo</i>	<i>Dictyocaulus spp.</i>	lungworm
<i>Interrogans serovar</i>	<i>pomona</i> <i>grippotyphosa</i> <i>icterohemorrhagia</i> <i>canicola</i>	<i>Hypoderma spp.</i>	grubs, heel fly larvae
		<i>Hematopinus/</i> <i>Linognathus spp.</i>	lice
		<i>Fasciola hepatica</i>	common liver fluke
<i>Pasteurella spp.</i>	pasteurellosis (<i>P. hemolytica</i>) pasteurellosis (<i>P. multocida</i>)	<i>Eimeria/Coccidia spp.</i>	coccidia
		flies	flies

Table 2. List of agents or disease challenges that can threaten the replacement heifer from the time of conception to joining the mature cow herd

Subclinical or Clinical Disease Threats			
IBR	Clostridial agents (8)		Roundworms
BVD	Leptospira (5)		Lung worms
PI3	Anaplasma		Grubs
BRSV	<i>C. fetus</i> (Vibrio)		Lice
<i>H. Somnus</i>	<i>T. fetus</i> (Trichomonas)		Flukes
Pasteurella	<i>B. abortus</i> (Brucella)		Coccidia

Table 3. Potential disease challenges facing the heifer replacement calf, calving-to-weaning

Survival/Development	Reproductive/Fetal	Neonate
IBR		IBR
BVD		BVD
PI3		PI3
BRSV		<i>H. Somnus</i>
<i>H. Somnus</i>		Pasteurella
Pasteurella		Clostridial agents (8)
Clostridial agents (8)		Leptospira (5)
Leptospira (5)		Coronavirus
Roundworms		Rotavirus
Lung worms		<i>E. coli</i>
Grubs		umbilical infection
Lice		septicemia
Flukes		
Coccidia		

Table 4. Potential disease challenges facing the replacement heifer, weaning-to-breeding

Survival/Development	Reproductive/Fetal	Neonate
IBR	IBR	
BVD	BVD	
PI3	<i>H. Somnus</i>	
BRSV	Leptospira (5)	
<i>H. Somnus</i>	Anaplasma	
Pasteurella	<i>C. fetus</i> (Vibrio)	
Clostridial agents (8)	<i>T. fetus</i> (Trichomonas)	
Leptospira (5)	<i>B. abortus</i> (Brucella)	
Roundworms	Roundworms	
Lung worms	Lung worms	
Grubs	Grubs	
Lice	Lice	
Flukes	Flukes	
Coccidia		

Table 5. Reproductive tract score (RTS) relationship to pregnancy rate and average conception date^a

RTS	Number	PR ^b	PR ^c	Number	DTC ^d
1	13	0	38	4	35
2	69	23	61	42	25
3	185	32	70	137	17
4	58	55	93	54	15
5	293	54	85	248	13

^aHeifers synchronized with either Syncro-mate B or MGA-PGF.

^bPregnancy rate (%) for the first 5 days of the breeding season.

^cPregnancy rate (%) for the breeding season, approximately 60 days.

^dDays to conception (DTC), the average days into the breeding season that conception occurred.

(Anderson et al., 1991)

Table 6. Pregnancy rate in yearling heifers selected by reproductive tract score (RTS),^a yearling weight and pelvic area

Ranch	Number	AvRTS	% Pg (25 d) ^b	% Pg (45 d) ^b	% Pg ^b	Number	DTC ^c
A	100	3.3	62	85			
B ^d	31	4.1	84	90			
C ^d	50	4.3	88	94			
D ^e	179	2.2	23	46	64	119	33
E ^e	205	1.3	5	16	34	68	48
F ^e	151	1.9	15	65	86	130	37

^aRTS determined approximately 30 days prior to start of the breeding season.

^bPercentage pregnant at 25 days, 45 days, and the end of the breeding season.

^cDays to conception (DTC), the average days into the breeding season that conception occurred.

^dHeifers on ranches B and C were synchronized with MGA and PGF.

^eFlorida herds in 1991 and 1992.

(Modified from Anderson et al., 1991)

Table 7. Potential disease challenges facing the replacement heifer, breeding-to-calving

Survival/Development	Reproductive/Fetal	Neonate
IBR	IBR	IBR
BVD	BVD	BVD
PI3	<i>H. Somnus</i>	PI3
BRSV	Leptospira (5)	<i>H. Somnus</i>
<i>H. Somnus</i>	Anaplasma	Pasteurella
Pasteurella	<i>C. fetus</i> (Vibrio)	Clostridial agents (8)
Clostridial agents (8)	<i>T. fetus</i> (Trichomonas)	Leptospira (5)
Leptospira (5)	<i>B. abortus</i> (Brucella)	Coronavirus
Roundworms	Roundworms	Rotavirus
Lung worms	Lung worms	<i>E. coli</i>
Grubs	Grubs	
Lice	Lice	
Flukes	Flukes	
Coccidia		

Table 8. Potential disease challenges facing the replacement heifer, calving-to-rebreeding

Survival/Development	Reproductive/Fetal	Neonate
<i>Cl. hemolyticum</i> (redwater)	IBR	IBR
Anaplasma	BVD	BVD
Roundworms	<i>H. Somnus</i>	PI3
Lung worms	Leptospira (5)	<i>H. Somnus</i>
Grubs	Anaplasma	Pasteurella
Lice	<i>C. fetus</i> (Vibrio)	Clostridial agents (8)
Flukes	<i>T. fetus</i> (Trichomonas)	Leptospira (5)
	<i>B. abortus</i> (Brucella)	Coronavirus
	Roundworms	Rotavirus
	Lung worms	<i>E. coli</i>
	Grubs	
	Lice	
	Flukes	

NOTES: