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Special Needs Facilities in Arid Climates

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Introduction

Often, when dairy producers are planning to build new dairy facilities a lot of time is spent on selecting and sizing the milking parlor and cow housing. However, often not enough effort is put into designing, selecting, and sizing special needs facilities. There are an overwhelming number of reasons from a cow health and milk production standpoint to have a well-designed special needs facility that will not be a barrier to management. The transition from a pregnant cow to a lactating cow represents the period of greatest challenge to the health and productivity of the dairy cow (Curtis et al., 1985). The majority of metabolic and infectious disease the cow will experience will occur in the first weeks of lactation. The sudden onset of milk production outpaces the animal's ability to increase intake of nutrients placing the animal in negative balance for such vital nutrients as energy, protein and calcium in early lactation. Cows failing this metabolic challenge can develop milk fever, ketosis and displaced abomasum. The hormonal changes associated with the act of calving have a suppressive effect on the immune system of the animal increasing susceptibility to infectious diseases such as mastitis and Salmonellosis. Negative energy balance and environmental stresses can have an additive effect on immune cells and further suppress the animal's resistance to infection. To reduce disease and improve the productivity of the cow we must design facilities and strategies to maximize feed intake and reduce "stress" on the transition cow. Stress can take many forms but generally results in an increase in cortisol release by the cow, which tends to reduce immune cell function.

This paper discusses the issues associated with special needs facilities. The examples in this paper are based on a 2,400 lactating cow dairies that have chosen to use dry-lot or dessert cooled housing.

(continued on page 3)

Originally presented at the Arizona Dairy Production Conference, October 17, 2002, Phoenix, Arizona

New Mexico State University Extension Dairy Website: http://www/nmsu.edu/~dairy

The following videos are available for checkout from New Mexico State University. To obtain a video call Kathy Bustos, (505) 646-3326 or kbustos@nmsu.edu and the video will be sent in the mail, pending availability. There is only one copy of each video available, so we request that videos be returned within two weeks. Note that four of the videos contain an English and Spanish version.

1. The Milking School. Utah State University. Spanish and English. 30 minutes
2. Fitting and Showing Your Dairy Animal....A Winning Experience. Department of Dairy Science, University of Wisconsin. 20 minutes
3. Proper Milking Procedure. University of Florida. Spanish and English. 12 minutes
4. Milking Machine Maintenance. University of Florida. Spanish and English. 16 minutes
5. The Basics of Vacuum and Milking Systems. DHIA Services, 1991. 53 minutes
6. Understanding Dairy Cattle Behavior to Improve Handling and Production. Livestock Conservation Institute, 1992
7. Managing Milking/Ordenar Lecheria. Spanish and English. 1999. 33 minutes
8. Get Milk! Joining A Dairy Crew. University of New Hampshire, 1999. 45 minutes

Need to Calculate Production Costs?

University of Wisconsin dairy farm management specialist, Gary Frank, has developed a Excel spreadsheet to calculate variable cost of production and total cost of production. To access the spreadsheet, go to http://www.wisc.edu/dairy-profit, click on Decision Making Tools, then go to costcwt.xls.

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Special Needs Facilities in Arid Climates, *continued from page 1*

Definitions

Before proceeding into the heart of this topic it is important to define some terms. Listed below are definitions used in these proceedings.

Special needs facility — The facility and equipment needed to manage cows and heifers starting with 21 days prior to calving (close-ups) to 16 after calving (fresh cows), sick cows, and high-risk lactating cows. This facility must ensure the safety and well being of employees and minimize the stress on a dairy animal(s) due to additional interactions between the employee and dairy animal.
Close-up — Cows and heifers that are from 4 to 28 days prepartum up to, but not including, calving.
Maternity — The area provided for cows and heifers to give birth.
Fresh cows and heifers — Cows and heifers from calving to 16 days postpartum.
Transition Period — Twenty-eight days prepartum to 16 days postpartum.
High-risk lactating cows — Cows that produce milk that can be sold but need special attention. Examples would be lame cows, older cows, slow milkers and cows that had just been released from the sick pen.
Mastitis and sick cows — Lactating and sick cows that have been treated with antibiotics.

Activities to be Completed in the Special Needs Facilities

A number of activities will need to be carried out in the special needs facilities. Numerous authors have presented materials discussing restraining and treating cows (Bickert 2000, Bickert 1998, Hardin, et al.1994, Veenhuizen and Graves, 1994). Table 1 lists these activities and the possible locations they could be carried out in the special needs facility. The decision to use or not to use headlocks needs to be made early in the design process. If headlocks are installed along the feed barrier, many of these activities may be carried out in headlocks. The planning team must determine how all the activities are going to be performed by the management team.

Grouping Strategies and Building Requirements

The size and number of cow groups on a dairy are critical planning factors. Factors affecting the number and types of groups are largely associated with parlor size, maximizing cow comfort, feeding strategies, reproduction and increasing labor efficiency. Lactating cows are allotted to one of seven classifications;

1. Healthy lactating heifers
2. Healthy lactating cows
3. Fresh cows and heifers with non-sellable milk (0 to 2 days postpartum)
4. Fresh cows with sellable milk (3 to 16 days postpartum)
5. Fresh heifers with sellable milk (3 to 16 days postpartum)
6. Sick cows with non-sellable milk
7. High risk cows with sellable milk.

The cows in classifications 3 to 7 are typically housed in the special needs area along with close-up cows and heifers. Figure 1 illustrates how cows and heifers would move through the special needs area, starting with 21 days prepartum. Some may opt to move heifers into this facility 28 to 35 days prepartum.

Heifers respond favorably when grouped separately from older cows. Heifers have lower dry matter intakes and greater growth requirements as compared to older cattle. In addition, mixing heifers with older cattle increases social pressure resulting in less than optimal heifer performance. Isolating heifers from mature cows immediately following calving is difficult on most dairies due to the small number of cows and heifers that will be 2 days postpartum at any given time. In Figure 1, cows and heifers are commingled for 2 days after calving.

Close-up dry cows and springing heifers differ in nutritional requirements. Close-up cows have greater intakes and are more likely to develop milk fever than heifers. Springing heifers may also benefit from a longer transition period than normally allowed for cows. Thus, heifers and dry cows should be separated. Close-up cows should be moved into a close up pen 21 days prior to calving. The diet in this pen typically has greater concentrations of protein and energy as compared to the far off dry cow diet. In addition, the diet should be low in calcium and potassium or contain anionic salts with appropriate amounts of calcium and potassium to prevent milk fever. Milk fever is generally not a problem with heifers but heifers may benefit from receiving the typical transition diet for 5 weeks rather than 3 weeks. Thus, feeding a diet with higher levels of protein and energy without anionic salts for 5 weeks prior to freshening would be beneficial for heifers. Allowance in the special needs facilities must be made during the initial planning process if heifers are to be housed 28 to 35 days prepartum rather than 21 days.

Immediately (24 to 48 hours) prior to calving close-up cows and heifers would be moved into a maternity pen with a bedded pack. Following calving, cows and heifers may be commingled or kept separate until the milk can be sold. This is the only area in the special needs area where cows and heifers may be housed together. If the facilities allow, keeping the cows and heifers separated during this period is recommended. Cows and heifers would be segregated when they move out of the fresh non-sellable pen into the fresh pens. Cows and heifers would be housed in the fresh pens for 14 days where rectal temperatures, dry matter intakes and general appearance can be monitored on a daily basis.

Other pens for mature cows and heifers in the special needs area would be a sick pen used to house cows treated with antibiotics and a high risk pen for lame cows and slow milkers producing sellable milk. An additional pen would also be supplied as a holding area for cows to be culled, dried off, or moved to another group of cows. Generally, this is a dry lot pen, which is conveniently located near the shipping area.

Space near the maternity area is needed to process and house calves after calving. Calf housing should be provided for the number of calves that will be born in a 24-hour period or sized according to the calf grower pick-up arrangements.

Table 2 provides recommended groups and group sizes for cows, heifers and calves. It is important to realize these group sizes have been increased to account for fluctuations in calvings and cow and heifer numbers. If these pens are only sized for static or average numbers, there will be a considerable amount of time where the special needs facilities are over stocked.

Transition Cow Cooling

Heat stress in the transition cow may impair health, decrease milk yield, and lengthen time to peak milk production and peak feed intake. Transition cows are particularly susceptible to infectious diseases and metabolic disorders. Cost estimates of impaired health in the fresh cow range from $145 per case of clinical ketosis to $340 per case for displaced abomasum (Hoard's Dairyman, 1996). Perhaps the biggest challenge in managing the fresh cow is to get her on feed the first few weeks postpartum. Aggressive postpartum appetites minimize the time spent in negative energy balance and are necessary to support high levels of milk production.

Research reports that prepartum cooling consistently decreases rectal temperature, lowers respiration rate, and increases calf birth weight. While milk production responses have been somewhat variable, these variations may be explained by differences in duration and extent of prepartum cooling across trials. Wiersma and Armstrong (1988) reported higher peak milk production (up to 5%) in cows cooled prepartum compared to those not cooled prepartum (88.4 versus 84.2 pounds milk per cow per day for cooled and control cows, respectively). Collier et al. (1981, 1982) also reported trends for higher milk production due to prepartum cooling (either as shades or evaporative cooling systems). Field trials have demonstrated increased peak milk yield and earlier days to peak production in fresh cows cooled with evaporative cooling compared to non-cooled cows (Stokes and Pope, 1997). Likewise, cooled cows showed greater lactation persistency compared to non-cooled control cows.

The endocrine system is perhaps more sensitive to moderate heat stress during the dry period than during lactation. Prepartum heat stress affects growth of maternal tissues (mammary gland, placental, or fetal tissue), influences postpartum mammary function (Collier et al., 1982), decreases calf birth weight (as much as 10%), reduces immunoglobulin content, and lowers nutrient (fat, protein, and lactose) concentration in colostrum. Calves born during the summer suck their dams less vigorously and may have impaired absorption efficiency caused by heat stress. This lowered absorption efficiency, coupled with the lowered content of colostrum, may increase the incidence of health complications and mortality in calves born during the summer and early fall.

Heat stress in cows prior to breeding and during the implantation phase may influence fertility. Wolfenson et al. (1988) reported an increase in both conception rate (59 vs 17%) and 90-day pregnancy rate (44 vs 14%) of cooled cows compared to non-cooled cows. Additionally, estrous behavior lasted longer in cooled (16 hours) than non-cooled (11.5 hours) cows having low body condition scores (average 2.6). Others have demonstrated a 15% decrease in services per conception and a reduction in the number of cows culled for reproductive failure (19 vs 7.7%)in response to prepartum cooling (Wiersma and Armstrong, 1988).

Postpartum production benefits of cooling dry cows may be dependent on the length of the cooling period. Initial research in this area involved shade as the cooling method. While adequate shade is recommended for the far off dry cow (first 4 to 6 weeks of the dry period), recent work suggests that more extensive cooling systems may be justified for close-up dry cows. Much of the immune and endocrine responses reported with transition cows may be applicable to other immune-compromised groups, such as high-risk, mastitis, and sick pens.

Cooling should be provided for all cows housed in the special needs area. Combinations of high pressure evaporative coolers and low-pressure soakers on the feed lines can be used in arid climates.

Dairy Layout

One of the issues with special needs facilities is where these facilities will be located on the dairy. They will either be located near the milking parlor or at the back of the dairy. Locating these facilities near the milking parlor reduces walking distance to and from the milking parlor. It also allows employees who work in close proximity to the parlor to observe close-up cows. The advantage of locating these facilities at the back of the dairy allows for easy movement of far off dry cows, beef cows and cows that have been dried off to and from the special needs facilities. Locating these facilities away from the main parlor may necessitate the need for a hospital parlor. If the dairy has two main parlors in a head to head configuration, the special needs facilities can be split into two barns directly behind the parlors. Figure 2, 5, and 6 include a drawing of a 2,400 lactating cow dairy with special needs facilities incorporated. You will notice that the special needs facility requires the space equivalent to three pens of healthy lactating cows. Figure 3 includes a detailed drawing of a dessert cooled building that would include the special needs facility. An end view of a dessert cooled barn is presented in Figure 4.

Risk Management and Biosecurity

The special needs area provides a dairy an opportunity to manage risk through disease control measures (Wells, 2000). Manageable risks include disease (both animal and human), financial loss, marketability of milk and animals, and potential liability. Animals housed in these facilities are particularly vulnerable to contracting new infections. This is especially true for fresh cows, which have suppressed immunity around the time of calving. The newborn calf is at risk to contract Johne's disease (*Mycobacterium paratuberculosis*). Cleanliness and daily maintenance of the calving area and the special needs facilities are critical. This area also provides an excellent opportunity to reduce the risk of antibiotic contamination of milk, as treated animals can be effectively isolated away from the lactating herd.

It is important to identify potential risks and develop a prioritized list and appropriate control measures. The manager needs to gather information and advice from the herd veterinarian and others to properly assess the exposure to these various diseases and develop a plan. Some of the pathogens generally regarded as high risk for dairy herds include *Staphylcoccus aureus*, *Mycobacterium paratuberculosis* (Johne's disease), bovine viral diarrhea (BVD) and Salmonella species. In addition, diseases such as mycoplasma, foot warts, Chlamydia and other pathogens for which there is not an effective vaccine could jeopardize individual cows as well as herd health. The highest risk for introduction of new disease into the herd comes from purchased cattle. Therefore, an effective program of prescreening and isolation of new arrivals is an important key element of an effective biosecurity program. A location for accepting, processing and quarantining new arrivals should be located at least one-half mile from the closest animal facility. An additional risk exists with movement of animals in multiple site operations. Consideration should also be given to cattle movement, people movement, vehicles and equipment, feedstuffs, birds, rodents and wild ruminants, water and manure management.

An effective biosecurity program needs a written document. It must be clearly communicated to employees, consultants and visitors. Dairies should have appropriate signage to alert and remind people of the dairy's policies. The biosecurity plan should include a drawing depicting the traffic flow plan for all activities on the dairy. Access to the special needs facilities should be limited to only those personnel that are necessary to carry out the daily activities. This minimizes the transfer in or out of organic material or contaminated equipment that could spread infectious disease. Veterinarians, hoof trimmers, service persons, sales people and any other visitors to the dairy need to have easy access and a defined area where they are to perform their service to the dairy. This minimizes unnecessary traffic around the dairy. The capability to disinfect equipment should be provided in close proximity to working areas. Professional, delivery and service activities as well as sales personnel need to be aware of the dairy's policy on disease containment. Equipment and vehicles should be clean and/or disinfected. Clothing should also be clean and footwear should be of the type that can easily be disinfected. In some cases, on-site disposable coveralls and shoe covers may be provided.

Vehicles entering the dairy to deliver new arrivals should be afforded an entry point that allows bypass of the majority of the dairy and easy access to the isolation/quarantine area. Vehicles arriving to remove dead or cull animals should have a designated location where easy loading is available and away from the special needs area.
This area could also double as a location where the herd veterinarian could perform post mortem examinations on dead animals. A provision for cleaning and disinfection should be considered. After removal of the carcass and rinsing of the area, a final disinfection should occur. Examples of disinfectant solutions include chlorhexidine diacetate (Nolvasan®-S),sodium hypochlorite (bleach),quaternary ammonium chloride (Spectrosol®)and quaternary ammoniums with bis-n-tributylin oxide (Roccal®-D Plus).

Summary

Often dairy producers cut corners when building special needs facilities. Under sizing these facilities can make it impossible for employees to manage transition cows. On the other hand, the best special needs facilities will only be successful if good management practices are in place.

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Table 1. Possible areas activities can be completed in the special needs facilities.

Activity	Lockups	Chute	Palpation Rail	Shipping Area	Parlor Equipment Room	Maternity	Table
Drenching	X	X					
Injections	X	X	X				
Rectal Temperatures	X	X	X				
Urine pH	X	X					
I.V.'s	X	X					
Sorting	X	X	X				
Palpations	X	X	X				
Insemination	X	X	X				
Postmortem Exams				X			
Hoof Trimming		X					X
Surgery	X	X					
Milk Pasteurization					X		
Pulling Calves						X	
Process Calves						X	
Shipping				X			
Drying Off					X		
Treat Mastitis					X		

Table 2. Recommended groups for cows housed in the special needs area in a 2,880 cow dairy (2,400 lactating cows).

Group	**Average Time in Facility**	**% of Lactating Herd**	**# of Cows**
Close-up cows	21 days	6%	144
Close-up heifers	21 days	3%	72
Maternity cows	3 days	.33%	8
Maternity heifers	3 days	.33%	8
Maternity overflow	3 days	.33%	8
Fresh cows & heifers, non-sellable milk	2 days	1%	24
Fresh cows	14 days	3.5%	84
Fresh heifers	14 days	1.5%	36
Mastitis & sick cows, non-sellable milk	N/A	2%	48
High risk sellable milk	N/A	2-6%	48-144
Cull and dry cows	N/A	1.5%	40
Calf housing	24 hours		12

Figure 1. Timeline to move close up and fresh cows through the special needs area.

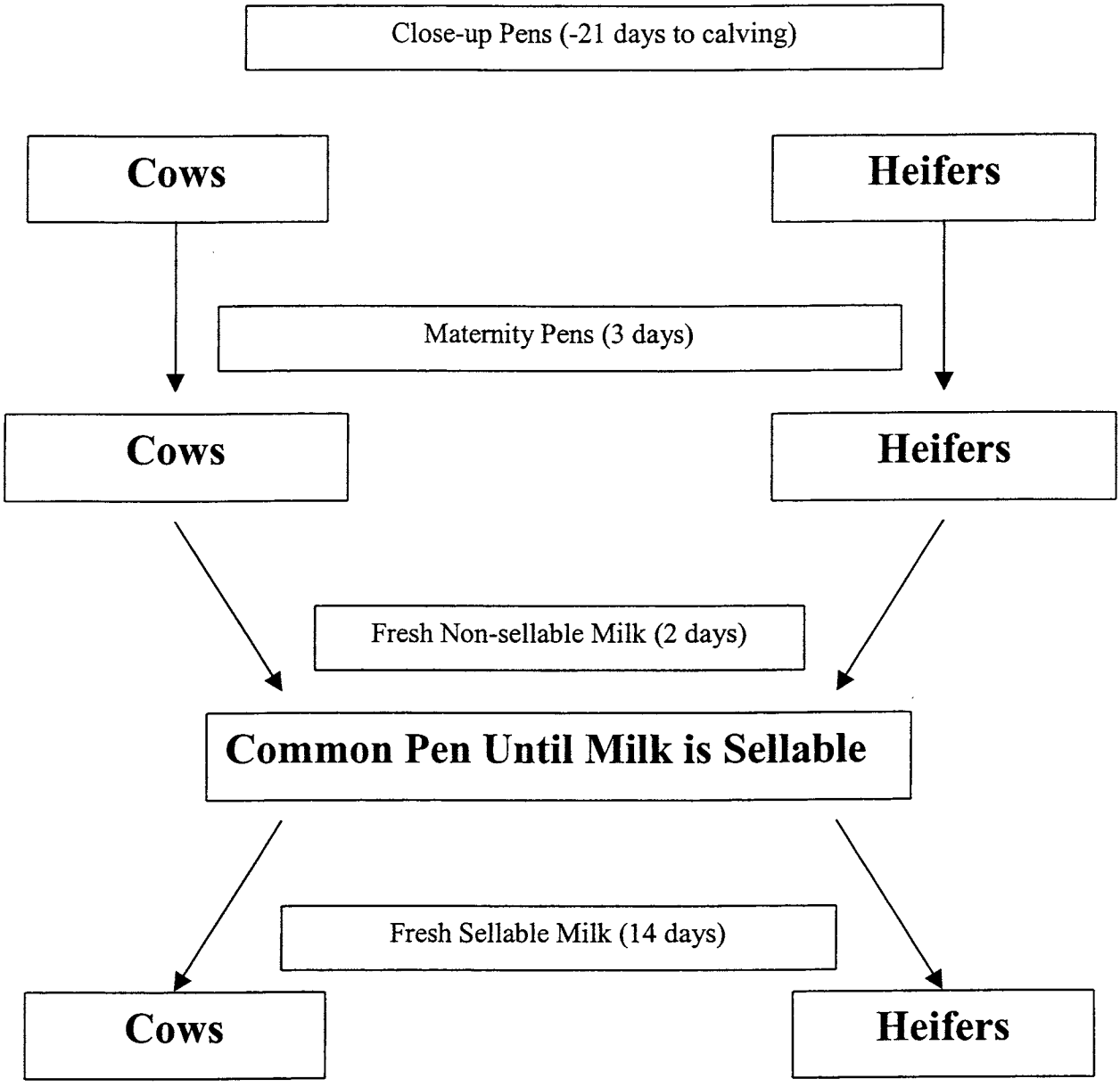


Figure 2. 2400 cow lactating dairy utilizing dessert cooled barn.

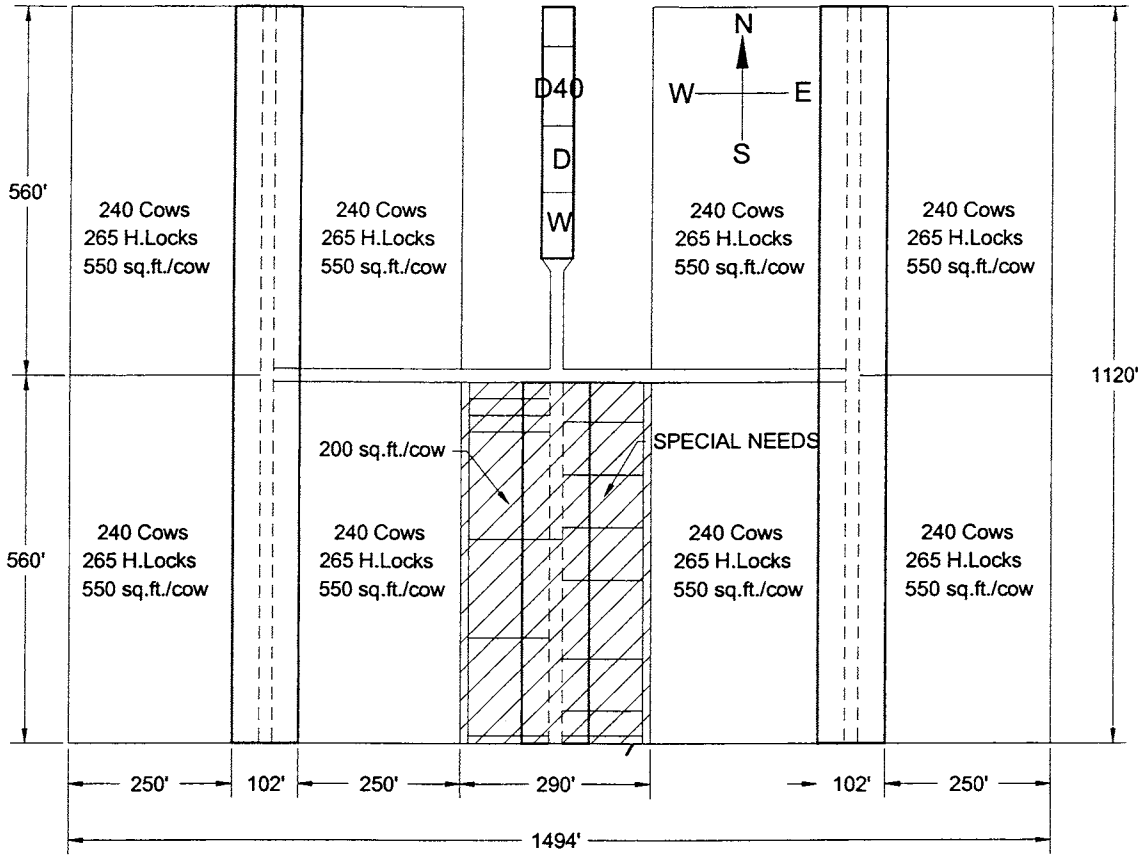


Figure 3. Special needs facilities for a 2400 lactating cow dairy utilizing dessert cooled barn.

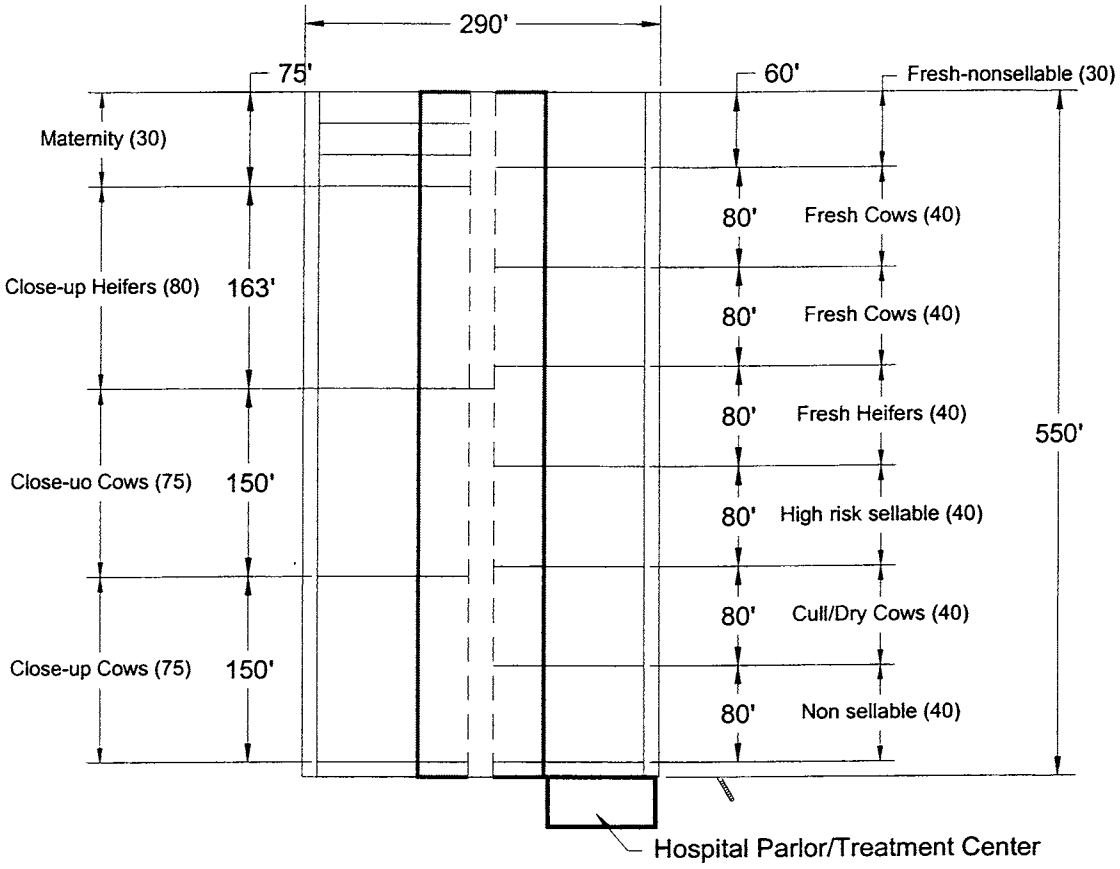


Figure 4. End view of a dessert cooled barn.

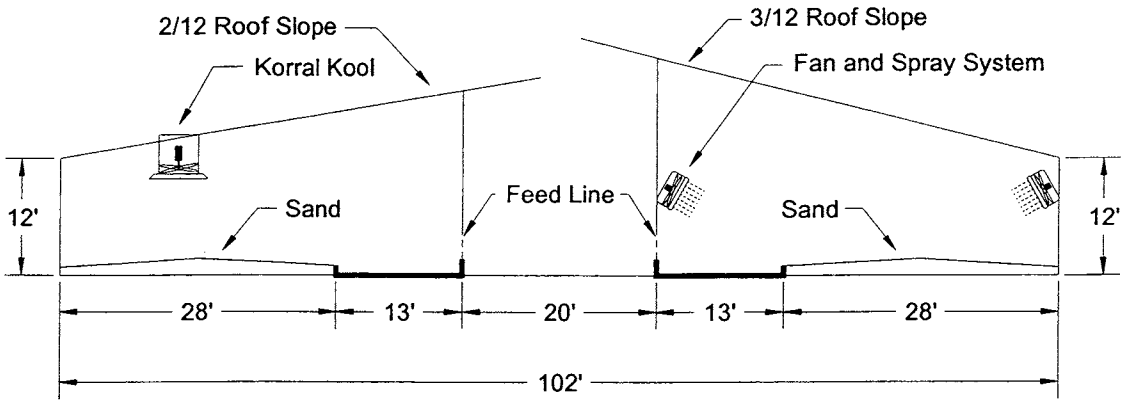


Figure 5. 2400 lactating cow facility utilizing dry-lot housing in an H design.

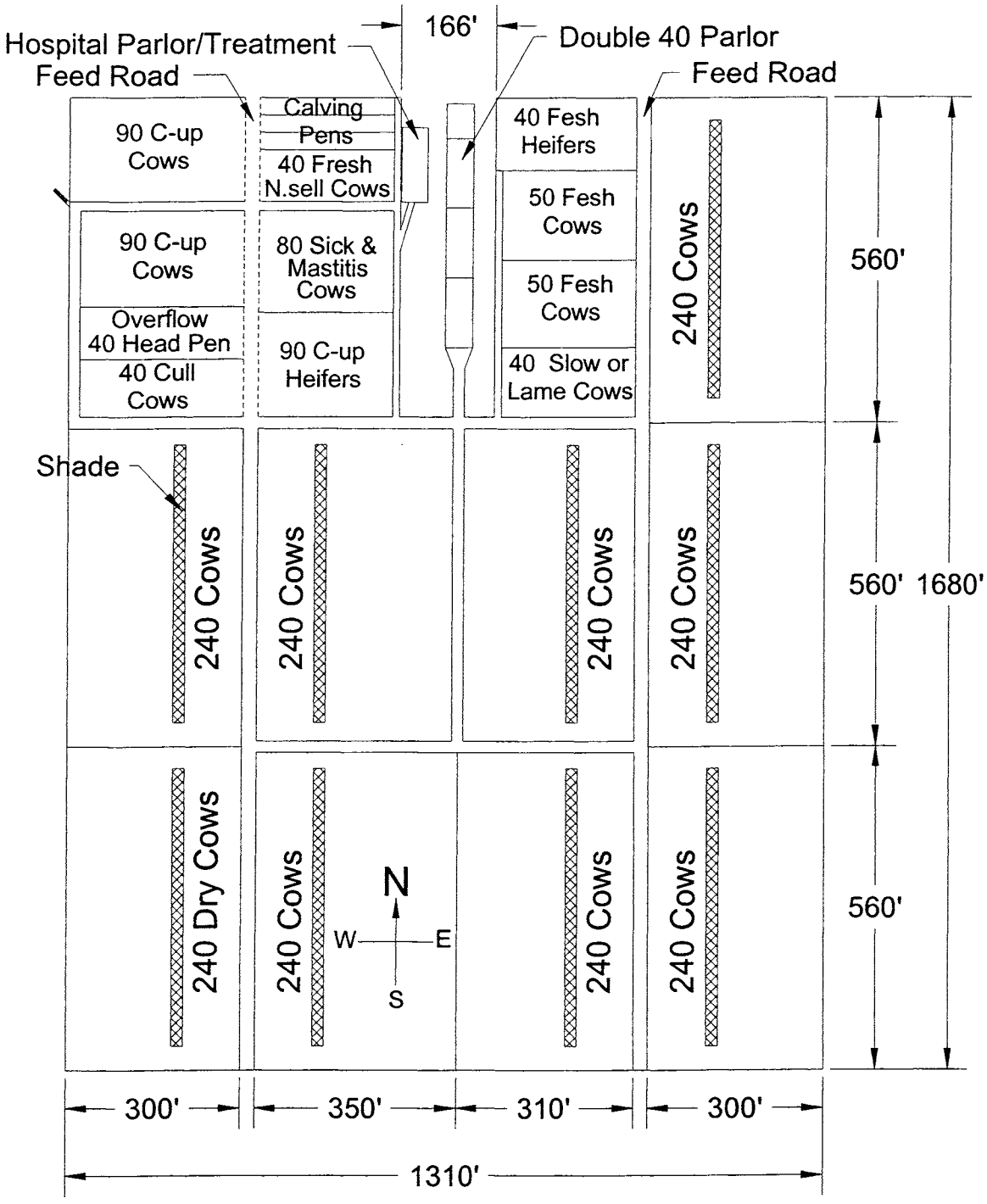
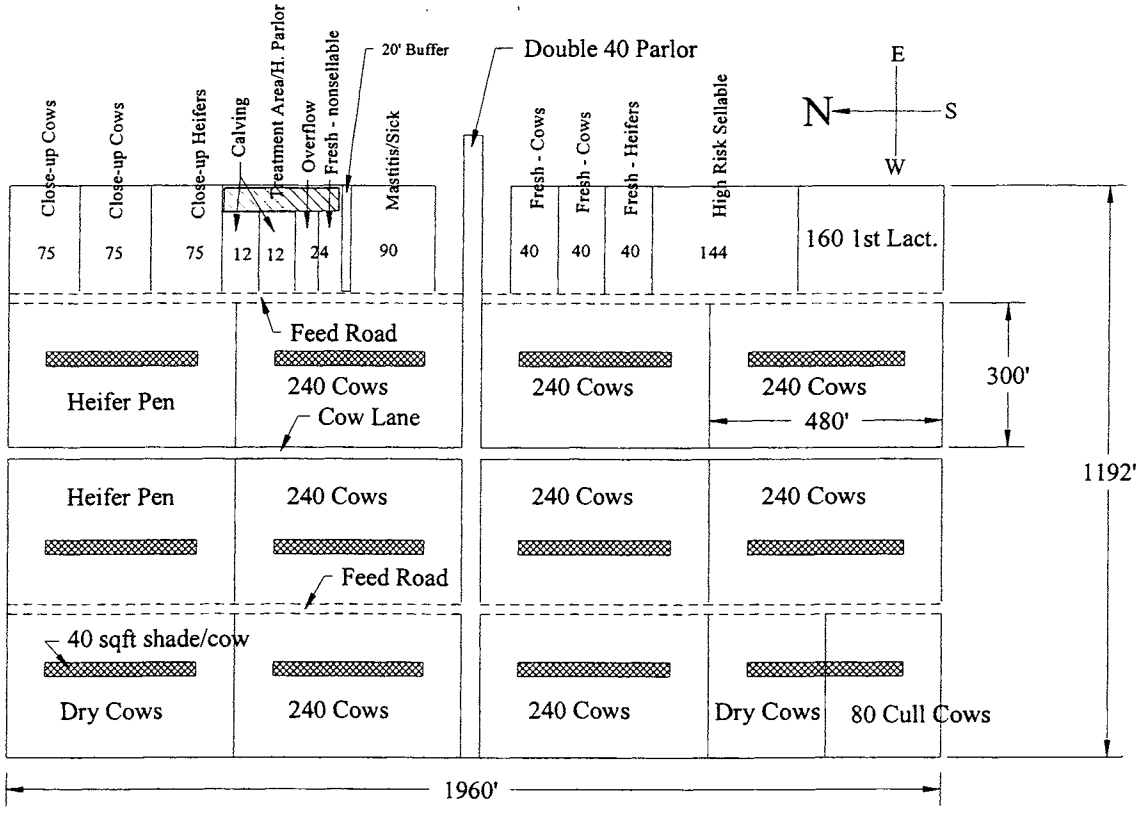


Figure 6. 2400 lactating cow dairy utilizing dry-lot housing in a T design.



HIGH COW REPORT
SEPTEMBER, 2002

MILK

Arizona Owner	Barn #	Age	Milk	New Mexico Owner	Barn #	Age	Milk
* Stotz Dairy West	122663	4-7	47,170	Pareo Dairy	1551	8-02	39,286
* Mike Pylman Dairy	3757	5-1	43,150	McCatharn Dairy	1968	7-05	38,732
* Stotz Dairy West	12110	4-11	39,340	Pareo Dairy	555	4-04	36,634
* Stotz Dairy West	11428	5-5	39,030	S.A.S. Dairy	396	9-00	36,375
* Stotz Dairy West	6870	6-1	38,080	Pareo Dairy	2123	5-08	35,522
* Martha Linda Dairy	3863	7-7	37,458	S.A.S. Dairy	1690	7-00	35,344
* Mike Pylman Dairy	3563	5-2	37,430	* Goff Dairy	14437	4-03	35,100
* Mike Pylman Dairy	3402	5-6	37,310	Pareo Dairy	1762	7-10	35,045
* Stotz Dairy West	13144	4-2	37,290	* Break-Away Dairy	160	8-06	34,980
* Dutch View Dairy	1417	5-5	37,050	S.A.S. Dairy	3674	4-02	34,876
FAT							
* Stotz Dairy West	12663	4-7	1772	Pareo Dairy	4027	8-00	1457
Shamrock Dairy	18620	5-8	1657	S.A.S. Dairy	1800	9-00	1447
* Mike Pylman Dairy	4726	4-6	1489	Pareo Dairy	1551	8-02	1418
* Stotz Dairy West	12170	4-11	1461	McCatharn Dairy	1968	7-05	1322
* Mike Pylman Dairy	4397	4-11	1458	S.A.S. Dairy	3774	4-10	1317
* Mike Pylman Dairy	5079	4-1	1455	Price's Roswell Farm	2496	3-11	1296
* Stotz Dairy West	13190	4-1	1447	Price's Roswell Farm	1989	4-06	1268
* Mike Pylman Dairy	3402	5-6	1431	Pareo Dairy	1762	7-10	1266
* Mike Pylman Dairy	3757	5-1	1430	Price's Roswell Farm	5785	6-06	1255
Mike Pylman Dairy	3779	5-1	1421	Price's Roswell Farm	840	6-01	1244
PROTEIN							
* Stotz Dairy West	12110	4-11	1164	S.A.S. Dairy	3774	4-10	1089
* Stotz Dairy West	12663	4-7	1159	Pareo Dairy	81	5-00	1080
* Mike Pylman Dairy	5292	2-10	1151	Pareo Dairy	1551	8-02	1076
* Stotz Dairy West	11428	5-5	1132	Pareo Dairy	9073	7-00	1057
* Stotz Dairy West	11034	5-11	1110	Ken Miller Dairy	629	5-00	1049
* Mike Pylman Dairy	3757	5-1	1095	Pareo Dairy	31	4-09	1047
* Dutch View Dairy	200	3-11	1093	S.A.S. Dairy	3815	4-05	1046
* Stotz Dairy West	14567	3-1	1091	S.A.S. Dairy	3674	4-02	1045
* Stotz Dairy West	13190	4-1	1072	McCatharn Dairy	1968	7-05	1039
* Stotz Dairy West	6870	6-1	1065	* Hide-Away Dairy	1926	7-06	1031
* Stotz Dairy West	12794	4-6	1065	* Goff Dairy	2047		1031

* 3X milking

ARIZONA – TOP 50% FOR F.C.M. [b]
SEPTEMBER, 2002

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	R.R.
* Stotz Dairy	2128	28,017	986	28,104	43
* Red River Dairy	4053	27,615	984	27,899	35
University of Arizona Holsteins	173	26,322	947	26,740	18
Martha Linda Dairy	1869	25,583	932	26,011	30
* Mike Pylman Dairy	2700	25,179	888	25,288	32
* Stotz Dairy East	1325	24,977	871	24,925	28
* Arizona Dairy North	2654	24,512	867	24,673	35
* Hillcrest Dairy	2377	24,710	846	24,405	46
University of Arizona Brown Swiss	114	22,687	896	24,341	36
* Arizona Dairy South	3249	24,361	843	24,206	33
Paul Rovey Dairy	425	23,813	840	23,919	34
Desert Ridge Dairy LLC2	488	23,720	835	23,798	27
* Del Rio Holsteins	1243	23,511	840	23,789	27
* Zimmerman Dairy	1257	23,173	830	23,480	30
* Wigwam Dairy	1511	23,002	831	23,423	33
Butler Dairy	628	23,260	813	23,333	29
* Saddle Mountain Dairy	2166	23,479	769	22,622	26
* Dutch View Dairy	1691	22,502	787	22,492	30
* Danzeisen Dairy, LLC	1206	21,467	779	21,916	39
* Dairyland Milk Company	2525	22,269	749	21,775	21
* Del Rio Brown Swiss	185	20,966	778	21,684	35
Gladtime West Holsteins	343	21,973	749	21,648	23
* R.G. Dairy, LLC	1338	21,539	746	21,411	28
Parker Dairy	4365	20,503	762	21,223	23
* Goldman Dairy	2048	21,133	745	21,219	24

TOP 50% ACTUAL MILK – OFFICIAL & UNOFFICIAL HERDS FOR NEW MEXICO

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	R.R.
* Pareo Dairy #1	1369	26,464	934	26,591	31
* Hafliger Dairy	1717	25,968	954	26.701	41
* Do-Rene Dairy	2867	25,864	891	25,634	30
McCatharn North Dairy	1056	25,062	844	24,525	40
* Hide-Away Dairy	2196	24,705	844	24,370	20
Ken Miller Dairy	379	24,407	815	23,771	29
* Tallmon Dairy	558	24,126	861	24,396	29
Pareo Dairy #2	2842	23,889	887	24,715	19
S.A.S. Dairy	2065	23,794	858	24,204	38
Price's Roswell Farm	2791	23,059	826	23,367	35
* Goff Dairy	4336	22,764	817	23,093	45
* Vaz Dairy	1558	22,681	780	22,457	34
* High Plains Dairy	1681	22,428	830	22,457	34

* 3X a day milking

[b] average milk and fat figure may be different from monthly herd summary; figures used are last day/month

ARIZONA AND NEW MEXICO HERD IMPROVEMENT SUMMARY FOR OFFICIAL HERDS TESTED SEPTEMBER, 2002

		ARIZONA	NEW MEXICO
1.	Number of herds	50	26
2.	Total cows in herd	70,123	41,281
3.	Average herd size	1482	1588
4.	Percent days in milk	83	86
5.	Average days in milk	204	196
6.	Average milk – all cows per day	55.5	61.7
7.	Average percent fat – all cows	3.6	3.5
8.	Total cows in milk	58,202	35,539
9.	Average daily milk for milking cows	64.9	71.8
10.	Average days in milk – 1st breeding	84	75
11.	Average days open	157	143
12.	Average calving interval	13.7	14.0
13.	Percent somatic cell – linear 0-4	83	79
14.	Percent somatic cell – linear 5-6	10	13
15.	Percent somatic cell – linear 7 & above	7	5
16.	Average previous days dry	63	70
17.	Percent cows leaving herd	34	34.6
		STATE AVERAGE	
	MILK	22,036	22,101
	Percent butterfat	3.6	3.6
	Percent Protein	3.0	3.0
	Pounds fat	791	785
	Pounds protein	661	664

ARIZONA COOPERATIVE EXTENSION
U.S. DEPARTMENT OF AGRICULTURE
The University of Arizona
Tucson, Arizona 85721

OFFICIAL BUSINESS
PENALTY FOR PRIVETE USE, $300

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Mark your calendar

- Southwest Nutrition and Management Conference, Phoenix, Arizona, February 20-21, 2003
- Arizona Dairy Day, Phoenix, Arizona, March 7, 2003
- Western Dairy Management Conference, Reno, Nevada, March 12-14, 2003