

Using DHI Records in Reproductive Management

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The famous black baseball player, Satchel Page, once said, "If you don't know where you're going, you might end up somewhere else." Good dairy records are essential to "know where you're going" in managing a dairy herd. A commitment to accurate cow identity and day-to-day recording of all events, coupled with modern computer record systems, will pay a high return per dollar invested.

DHI Reproductive Records

Records are especially critical in the reproductive management of a dairy herd. DHI can provide the basis for a sound reproductive record system if the DHI Supervisor is provided with accurate information. Most DHI Processing Centers provide ability for input of these items:

- Freshening dates
- Abortion dates
- Heat dates
- Breeding dates
- Service number
- Service sire identity
- Veterinarian check codes (pregnant, open, okay to breed)
- Coding reproductive culls (do not breed)
- Items listed above on replacement females

These inputs are used to provide the current reproductive status of each cow. These four "action lists" are also provided on an option basis:

- Cows to breed
- Cows bred but not diagnosed pregnant
- Cows to turn dry
- Cows to calve

DHI Processing Centers also provide reproductive summary information on a herd and optionally on a string basis. **Figure 1** shows the reproductive summaries for three DHI Processing Centers. Generally, information is summarized by at least two main groups (breeding herd and pregnant herd) and several parameters are given:

- (1) Frequency distribution of days open
- (2) Frequency distribution of days to first service
- (3) Frequency distribution to breeding or heat intervals
- (4) Average days open, days to first breeding, services per conception, heat detection index, percent cows in milk and average days in milk
- (5) Projected calving interval or days open
- (6) Services per conception and average age at first breeding for replacement females.

DHI Processing Centers also provide these reproductive summary statistics by region, state and levels of rolling herd average for dairymen to use in evaluating their performance. **Table 1** gives a set of average values and corresponding reasonable goals for several reproductive parameters. These goals are based on actual performance by the top 10% of the Holstein herds based on reproductive performance.

FIGURE 1. Examples of Reproductive Summary Sections of Herd Summaries From Three Dairy Record Processing Centers. Mid-States DRPC

REPRODUCTIVE SUMMARY															
GROUP	REPLACE- MENT FEMALES	PRODUCING FEMALES		NO OF ANIMALS OPEN			AVG DAYS OPEN	NO OF ANIMALS BRED			DAYS TO FIRST BRED	BREEDING INTERVAL			DAYS MINIMUM FRESHENING INTERVAL
		NUMBER	AVG DAYS SINCE FRESH	< 60 DAYS	60-120 DAYS	> 120 DAYS		ONCE	TWICE	3+ TIMES		< 18 DAYS	18-24 DAYS	> 24 DAYS	
PREGNANT	25	36	302	2	26	8	107	14	10	1	68	1	10		385
POSSIBLY PREGNANT	6	21	144		17	4	101	3	2		72		2		379
OPEN	46	22	76	10	10	2	76	TOTAL ANIMALS: 88			AVERAGE SERVICES	REPLACE- MENTS	PRODUCING FEMALES	TOTAL	
								TOTAL SERVICES: 150			PER CONCEPTION	1.4	1.8	1.7	

DRY DAYS SUMMARY				
NUMBER < 40	NUMBER 40-70	NUMBER > 70	TOTAL	
			NUMBER	AVG DAYS DRY
8	36	7	51	52

REPRODUCTIVE SUMMARY								
	NUMBER COWS	DAYS SINCE CALVING	DAYS TO 1ST HEAT	DAYS TO 1ST BREEDING	DAYS OPEN	SERVICES PER CONCEPTION	NO COWS EXTENDED CALV INTERVAL	MINIMUM CALVING INTERVAL MONTHS
PREGNANT COWS	22	253	90	90	106	1.5	2	12.7
POSSIBLY PREGNANT	5	94	65	65	70	1.2		11.5
PROBLEM COWS	3	168	122	122	151	2.0	2	14.1
MAX CONCEPTION RATE	HEAT DETECTION INDEX		COWS IN HEAT BY 60 DAYS			REPEAT BREEDERS		
	67%		65%		23%		13%	

DRPC @ Raleigh

SUMMARY OF CURRENT BREEDING HERD

DESIRED NO. DAYS OPEN BEFORE BREEDING		COWS WITH NO BREEDING DATES OR DIAG. OPEN					COWS BRED SINCE 051785				
60		OPEN FEWER THAN 60 DAYS	OPEN 60-100 DAYS	OPEN 101-140 DAYS	OPEN OVER 140 DAYS	DIAG. OPEN	DAYS OPEN AS OF LAST BREEDING				BRED 3 OR MORE TIMES
TOTAL COWS IN BREEDING HERD	AV. NUMBER BREEDINGS FOR COWS OPEN OVER 100 DAYS AT LAST BREEDING	% OF POSSIBLE BREEDINGS THAT WERE SERVICED	AV. DAYS TO 1st BREEDING	NO COWS DIAG. OPEN	NO COWS DIAG. PREG.	NUMBER COWS	OPEN FEWER THAN 60 DAYS	OPEN 60-100 DAYS	OPEN 101-140 DAYS	OPEN OVER 140 DAYS	
54	2.3	30	82	1	4	14	6	3	8	1	3
						% OF TOTAL HERD	26	11	6	15	2
							6	11	9	15	11

REPRODUCTIVE SUMMARY OF TOTAL HERD

NUMBER COWS	DAYS OPEN AT 1st BREEDING				AV. DAYS TO 1st BREEDING	% OF POSSIBLE BREEDINGS THAT WERE SERVICED	BREEDINGS OR HEAT INTERVALS			% PROB. MINIMUM CALVING INTERVAL	AVG. DAYS OPEN	TOTAL PREG. NANT COWS	AVG. NO. BREEDINGS FOR PREG. COWS	SUMMARY OF SERVICE Sires WITH PD'S		BREEDINGS FOR PAST 12 MONTHS						
	OPEN FEWER THAN 30 DAYS	OPEN 30-80 DAYS	OPEN 81-100 DAYS	OPEN OVER 100 DAYS			LESS THAN 18	18 to 24	GREATER THAN 24					NUMBER	AVERAGE PD'S	NUMBER BREEDINGS	% SUCCESSFUL	NUMBER BREEDINGS PER CONCEPTION	1st BREEDING CONC. RATE			
	10	31	13	18																		
% OF TOTAL HERD	9	29	12	17			86	42	4	24	50	22	13.6	134	54	1.8	55	+90	176	50	2.0	55

TABLE 1. Reasonable Goals For Several Reproductive Management Factors.

Management Factors	Average For All Holstein Herds	Goals
Yearly av. % cows in milk	86%	87%
Yearly av. days in milk	173	165
Heat detection efficiency	42%	70%
Average days to 1st breeding	87	70
Percent bred or heat intervals 18-24 days	30%	40%
Percent problem cows	24%	15%
Services per conception	2.2	2.3
Projected minimum days open	135	110
Projected minimum calving intervals	13.6	12.8
Average days dry	70	65
Percent dry > 70 Days	30%	27%
Average age at 1st calving	29	28
Percent left herd (low production)	8%	8%
Percent left herd (reproduction)	8%	8%
Percent left herd (all other reasons)	18%	18%

NOTE: Goals based on top 10% of Holstein herds selected using Heat Detection Efficiency.

Using On-Farm Microcomputers with DHI

One of the biggest criticisms of DHI is the time delay from date of test until the dairyman receives his computer-processed reports. This delay is normally 7 to 10 days. Several DHI Processing Centers have developed optional programs which allow dairymen to access the DHI computer using on-farm microcomputers and a modem for telecommunications. Dairymen can transmit all daily events (calvings, breedings, health events, etc.) and request management reports based on the updated information. Normally, daily events are keyed and stored on the microcomputer and then uploaded as a batch to reduce connect time. These instant updating systems improve the effectiveness of DHI as a reproductive management tool. They also facilitate the input of additional information without impacting DHI Barn Sheet input by "traditional" DHI herds. Examples include complete herd health coding, technician number and user fields. Because these systems interact directly with the dairymen, the users can tailor reports specific to their management system. Table 2 gives an example vet. check list from the DART system. Software

TABLE 2. Example of DART Vet. Check List.

REFERENCE DATE 111886										PAGE 1							
07 — COWS FOR REPROD CHECK										(CONDENSED PRINT)							
COW	SPEC	DAYS	SVC	C	BRED-	DAYS	CURR	R	MOST	RECENT	HEALTH	CODE	FIRST	PRIOR	HEALTH	CODE	
BARN	MNGMT	IN	HEAT	NO	D	HEAT	CARR	T.D.	A	LIFETIME	REMARKS	REMARKS	MMDDYY	CODE	T	REMARKS	
NAME	PROB	MILK	INT.	BR	E	DATE	CALF	MILK	T	MMDDYY	CODE	T	MMDDYY	CODE	T	REMARKS	
31		101			H	9-23		71.0	C								
32		8								030186	MLFQ	N	TOD	022786	MLRQ	N	TOD
34		104	25	2		11-04	15	64.3	C								
86		39						79.5		031986	MRRQ	N	TOD	010486	MRRQ	N	GALL
96		107	10	2		11-08	11	70.8	C								
107		115		1		11-09	10	60.5	B	022984	OTRA	N	SLPUS-.5EV				
115		112		1		9-29	51	58.0	C	072086	CDIF	N	MILK FEV				
126		248	58	4		11-11	8	35.8	C	052186	PYOM	N	LUT, NOL	040286	PYOM	N	LUT
127		31						66.5		012286	OTRA	N	LRG OV DUC	011286	OTRA	N	GNRH
131		66		1		11-08	11	85.0	B	112785	PYOM	N	SL-LUT	100785	RETP	N	PEN
144		182	50	5		11-05	14	46.0	C	071385	MRFQ	N	TOD				
154		48	18		H	11-15		78.5		092585	PYOM	N	LUT	102484	PYOM	N	.5EV
155		15						74.6									
156		84	42	1		10-20	30	58.0	C	042184	MLRQ	N					
158		200	51	6		11-12	7	56.8	B	052186	PYOM	N	SL, EV	042584	CYST	N	RUPTURED
160	3-QT	25						62.5		012186	OTRA	N	GNRH	100185	MLFQ	N	
162		114		1		10-14	36	93.8	A	111684	DIGT	N	BOLUS				
168		65	17	1		11-03	16	74.5	C	092486	PYOM	N	EV, L2WK				
169		138	29	2		10-17	33	60.0	C	072386	PYOM	N	SL, LUT	070786	MLRQ	N	AMOX, K
170		21						82.5		082086	MLRQ	N	AMOX	081585	RETP	N	POLY
188		16						73.5		082284	PYOM	N	LUT				
208		134	46	3		11-13	6	66.5	A	111185	MRFQ	N	TOD	062685	PYOM	N	EV
210		85						64.5	C								
239		260	22	5		11-10	9	42.8	B	032686	PYOM	N	SL-HEAT	030786	RETP	N	EV-LUT-PO
240		203	100	2		11-14	5	47.3	B								
243	E-RAT	75		1		10-23	27	48.8	E	091086	MAST	N	CEF	121785	OTRA	N	CYS@Breed
245		115	20	3		11-09	10	60.8	C								
249		215	51	3		10-27	23	40.6	C	070886	MLRQ	N	TOD	052186	CYST	N	RUPTURED
263	E-RAT	98	27		H	9-21		67.3	C	101185	LAME	N	OXYTET				
264		143	48	1		11-14	5	69.5	B	072386	PYOM	N	EV, L2WK	062986	RETP	N	EV, LUT
271		129		1		10-10	40	50.0	C	082586	PYOM	N	LUT+L2WK	072386	PYOM	N	EV, P03X
286		25						78.8		082985	PYOM	N	EV				
287		86		1		10-31	19	60.0	B	030386	MLRQ	N	TOD	072485	PYOM	N	EV-POLY
291		146	22	2		11-13	6	63.3	B	092486	CYST	N	GNRH	091286	LAME	N	PEN, ABSS
293		111		1		11-14	5	55.5	A	092585	CYST	N	GNRH				
302		192	55	1	N	8-29		65.3	A	072386	OTRA	N	FIX TEAR	070286	PYOM	N	SL, TEAR, LU
304	E-RAT	28						72.5		011286	OTRA	N	GNRH	092585	CYST	N	GNRH
305		54						97.5		121885	CYST	N	GNRH				
310		103	41	1		10-22	28	49.8	D								
312		38			H	11-10		42.0		101386	MAST	N	AMOX, K	010386	OTRA	N	GNRH

is also available for complete management between test dates using a data base on the on-farm microcomputer. Test day uploads and downloads are used to exchange information with the DHI data base on the computer at the DRPC.

Routine Veterinarian Visits

DHI dairymen processing records at DRPC @ Raleigh are asked to indicate if their herd is on "routine pregnancy diagnosis." A study of our records indicates that 39% of the Holstein herds (1,976 herds) are on "routine pregnancy diagnosis." **Table 3** gives a comparison of the two sets of herds for several management variables. **Appendix figures 1 and 2** give the comparison for all items printed on the Herd

Summary (DHI-202). Herds on "routine pregnancy diagnosis" have much higher production (1,149 lbs) and superior reproductive performance. The advantage of \$134 in income over feed cost per cow per year would be several times the cost of this service.

DHI in the 1980's

Because of the long history of DHI, it is often perceived as an "official" production record program for registered herds. However, DHI has become a "management oriented" program. Reproduction records are just one phase of that "management orientation." I would like to take this opportunity to provide information supporting DHI as a total dairy recordkeeping system for dairymen.

TABLE 3. Comparison of 1,976 Holstein Herds Using Routine Pregnancy Checks With 3,085 Holstein Herds Not Using Routine Pregnancy Checks.

Management Variable	** Routine Preg. ** ** Diagnosis **		Difference
	Yes	No	
Cows Per Herd	125	94	+31
Rolling Herd Average Milk	16,330	15,181	+1,149
Yearly Av. Income Over Feed Cost	1,280	1,146	+134
Percent Cows In Milk	86.9	85.9	+1.0
Heat Detection Efficiency	47	36	+11
Average Days To First Breeding	85	88	-3
Projected Minimum Days Open	126	140	-16
Projected Minimum Calving Interval	13.4	13.8	-0.4
Percent Problem Cows	22	24	-2
Services Per Conception	2.4	2.0	+0.4
Average Days In Milk	170	172	-2
Average Days Dry	66	68	-2
Percent Dry > 70 Days	28	30	-2
Percent SCC Score 0-3	57	51	+6
Percent SCC Score 6-9	13	15	-2
Percent Identified By Sire	65	54	+11
Average PD\$\$ of Sires	31	22	+9
Average PD\$\$ of Service Sires	106	97	+9

There are several studies which support the cost effectiveness of DHI. A New York study of farm business records found that profits for DHI herds increased with herd size and with consecutive years on test (McCaffree, 1974). A study (Carley, 1986) of 2,712 dairy farms in the Southeast showed that those with DHI records averaged 1,027 lbs. per cow per year more than non-tested herds. This production advantage was found after adjusting for other management factors (A.I., forage testing, ration balancing and concentrate feeding methods).

Surveys of DHI members indicated that DHI's primary use is *not* for selling breeding stock. In a 1976 Pennsylvania study, only 29 percent indicated the sale of breeding stock as the primary reason (Croyle, 1976). In a more recent study in Ohio (Smith, 1985), the sale of breeding stock ranked fifth behind these four reasons:

- (1) To have monthly progress reports on how my herd is doing.
- (2) To be able to feed according to production.
- (3) To have lists of cows to breed, calve, cull, etc.
- (4) "Good" dairy farmers use DHI records.

Predicting Production Level with DHI Management Variables

There is ample evidence that DHI management factors can be used to establish reasonable goals which will, in turn, improve production per cow. A Minnesota study (Appleman, 1985) examined the relationship between six management factors and production. The management factors were:

- (1) Percent of herd with SCC score of 5 or more
- (2) Pounds per cow of concentrate fed
- (3) Percent of cows identified by sire
- (4) Percent of cows dry more than 70 days
- (5) Average PD\$\$ of sires
- (6) Percent cows leaving the herd

Herds with all six management factors above average produced 3,983 pounds per cow more than herds that were not above average on any of the the six factors. They found that no one single factor was an overriding influence.

A recent study was made by DRPC @ Raleigh to examine the relationship between production and eighteen management variables. The variables considered were:

- Herd size
- Yearly average % cows in milk
- Yearly average days in milk
- Yearly average days dry
- Yearly average lbs. concentrate fed
- Heat detection efficiency
- Average days to 1st breeding
- Percent problem cows
- Percent breedings successful
- Projected minimum days open
- Percent cows with sire identity
- Average PD\$\$ of sires
- Average PD\$\$ of service sires
- Percent left herd (low production)
- Percent left herd (all other reasons)
- Average linear SCC score
- Percent SCC score 0-3
- Percent SCC score 4 & 5

Appendix Table 1 gives the means for these items on 4,704 Holstein herds stratified by production level. **Appendix figure 3** is a Herd Summary (DHI-202) of the averages for the 168 herds with a rolling herd average of 20,000 lbs. of higher.

Stepwise multiple regression analysis was used to determine the order of importance of each management variable in predicting RHA milk. **Table 4** lists the top ten management variables from the list of 18 which were studied. It is interesting that percent cows with sire identity had the highest correlation with RHA milk. This variable probably reflects the overall individual cow interest and attention to detail shown by the herdsman. Percent cows in milk would be expected to relate well with RHA milk, since the herd average is based on all cows both milking and dry. Percent cows in milk has been computed by DHI Processing Centers for many years and it is a reasonably good estimate of reproductive performance, assuming overall culling rate is reasonably consistent from herd to herd. Heat detection efficiency is the best indicator of overall reproductive performance, and it emphasizes the importance of a sound

APPENDIX TABLE 1. Comparison of Management Factors by Rolling Herd Average Milk Production for 4,704 Holstein Herds.

Management Factor	Rolling Herd Average Milk Production										
	11000	11000 to 11999	12000 to 12999	13000 to 13999	14000 to 14999	15000 to 15999	16000 to 16999	17000 to 17999	18000 to 18999	19000 to 19999	19999
Number of Herds	175	203	310	460	673	659	755	625	442	234	168
Average Herd Size	85	101	97	118	114	113	107	102	103	95	99
Percent Cows In Milk	80	83	84	85	86	87	87	88	88	88	89
Average Days In Milk	170	178	174	175	173	175	173	171	171	171	173
Average Days Dry	85	75	72	71	68	66	65	64	63	62	60
Yearly Lbs. Concentrate Fed	5284	5805	6165	6131	6534	6302	6228	6481	6644	6480	6957
Yearly Income Over Feed Cost	679	834	899	1027	1108	1217	1279	1366	1441	1523	1706
Heat Detection Efficiency	26	28	30	37	37	44	44	46	49	51	52
Av. Days To 1st Breeding	90	91	87	87	88	87	86	86	86	87	89
Projected Minimum Days Open	155	154	144	138	138	134	130	128	126	126	131
Services Per Conception	1.8	2.0	1.9	2.1	2.2	2.3	2.2	2.2	2.2	2.3	2.3
Percent Problem Cows	34	30	28	25	25	21	21	20	19	20	22
Percent Cows With Sire ID	24	28	32	39	46	62	70	75	82	87	89
Av. PD\$\$ of Sires	19	8	13	15	17	22	26	32	35	40	47
Av. PD\$\$ of Service Sires	87	91	94	96	98	100	102	106	108	108	109
Average SCC Score	4.3	4.0	4.0	3.8	3.7	3.6	3.5	3.3	3.2	3.1	2.9
Percent SCC Score 0-3	39	45	45	49	51	54	56	61	63	64	71
Percent SCC Score 6-9	22	19	18	16	15	13	12	10	10	10	7

heat detection program. The independent R^2 values were derived from the simple regression of RHA milk on each management variable. Likewise, the linear change figures are the linear regression coefficients. For example, a change in one unit of SCC score (reduce from 4 to 3) would be expected to increase RHA milk by 1,053 lbs. **Appendix figures 4 through 10** give graphic representations of the relationship between RHA milk and seven of these management variables. Curvilinear regression (cubic) was used to plot these relationships.

Another approach to studying these relationships is to examine changes occurring over the period of a year. **Table 5** gives the relationship between RHA change (this year minus last year) and the corresponding yearly changes in the top ten of the same 18 management variables. Several points could be made:

- (1) Correlations (R^2 values) are not as high for this type of analysis (0.521 compared with 0.306).
- (2) Percent cows with sire identity changes from highest rank to 6th position.
- (3) Heat detection efficiency and percent left herd figures become more important.
- (4) Average linear SCC score ranks high in both types of analysis.
- (5) Percent days in milk and average days in milk rank high in both cases. These are indirect measures of reproductive performance.

Summary

The results of the studies shown here indicate that DHI can be a very cost effective management tool. Small changes in performance in one management area can result in substantial changes in production per cow. The full service

DHI program requires only about 150 lbs. per cow per year increase in production to pay the testing fees. This is less than ½ lb. per cow per day. Other options, such as owner-sampler, will cost less than one-half the full service price. It is disturbing to me that we can only sell this service to 45% of our dairymen when the cost-benefit ratio is so high.

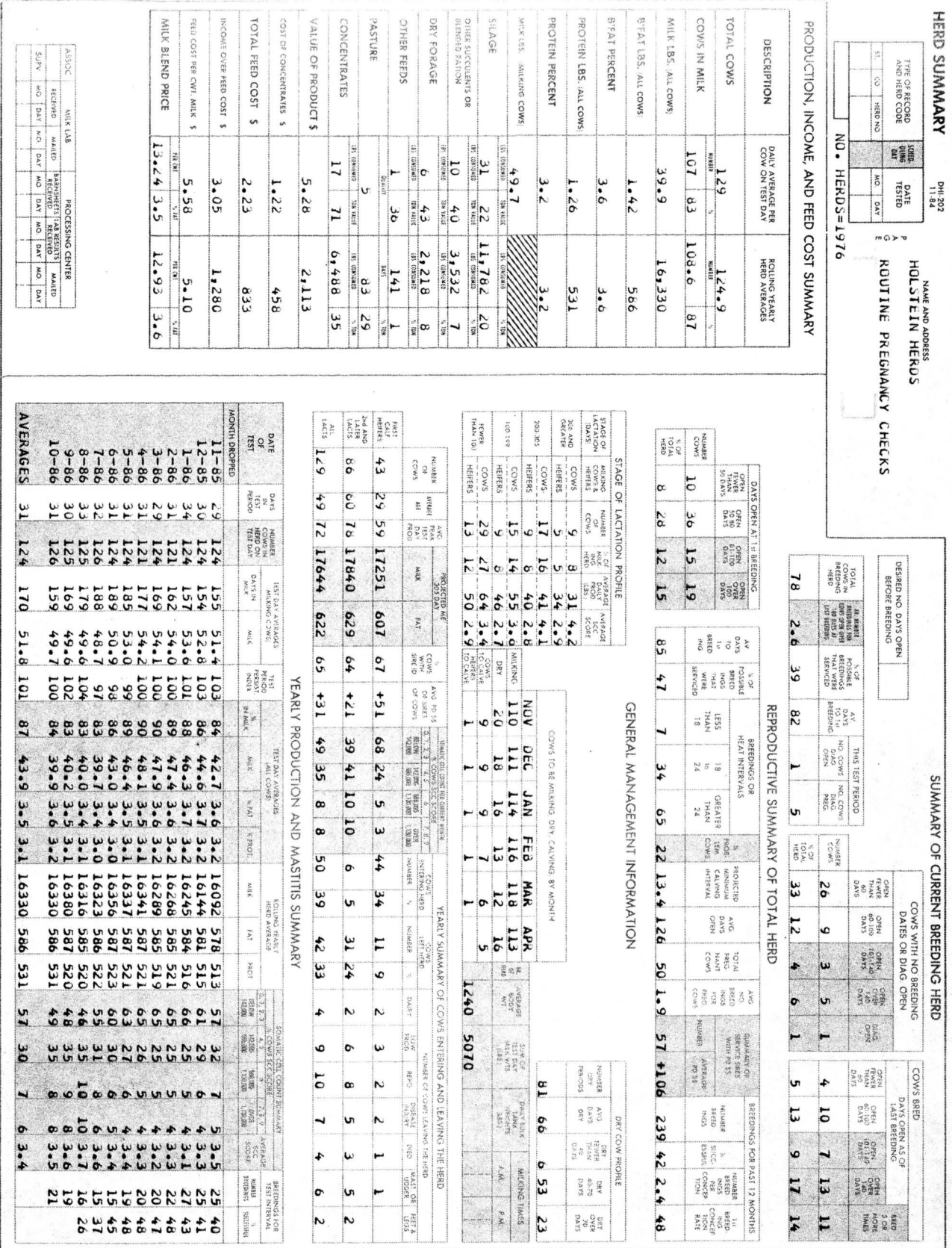
There is an old saying, "If you can't measure it, you can't manage it." Although DHI has some shortcomings, it is your best chance as veterinarians to get your clients to measure herd performance. We in DHI solicit your support to encourage your clients to enroll on DHI and to record events on a daily basis to make their DHI records complete and accurate.

It is my hope that the information presented here will help you in your educational efforts with dairymen. I would also encourage you to work with your DHI Processing Center to improve the record system. Your educational training and close working relationship with dairymen makes your profession an excellent source of suggestions for improving our DHI system.

References

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APPENDIX FIGURE 1. Herd Summary Averages For 1,976 Holstein Herds on Routine Pregnancy Diagnosis



APPENDIX FIGURE 2. Herd Summary Averages For 3,085 Holstein Herds Not On Routine Pregnancy Diagnosis.

SUMMARY OF CURRENT BREEDING HERD

DESIRED NO. DAYS OPEN BEFORE BREEDING		COWS WITH NO BREEDING DATES OR DIAG. OPEN				COWS BREED LAST BREEDING			
NO. DAYS	NO. COWS	OPEN 30 DAYS	OPEN 60 DAYS	OPEN 90 DAYS	OPEN 120 DAYS	OPEN 150 DAYS	OPEN 180 DAYS	OPEN 210 DAYS	OPEN 240 DAYS
56	22	18	7	3	10	3	5	3	7
2.2	83	32	13	5	18	5	9	5	13
TOTAL BREEDING HERD		NO. COWS				NO. COWS			
56		1				9			

SUMMARY OF CURRENT BREEDING HERD (CONT.)

DESIRED NO. DAYS OPEN BEFORE BREEDING		COWS WITH NO BREEDING DATES OR DIAG. OPEN				COWS BREED LAST BREEDING			
NO. DAYS	NO. COWS	OPEN 30 DAYS	OPEN 60 DAYS	OPEN 90 DAYS	OPEN 120 DAYS	OPEN 150 DAYS	OPEN 180 DAYS	OPEN 210 DAYS	OPEN 240 DAYS
56	22	18	7	3	10	3	5	3	7
2.2	83	32	13	5	18	5	9	5	13
TOTAL BREEDING HERD		NO. COWS				NO. COWS			
56		1				9			

REPRODUCTIVE SUMMARY OF TOTAL HERD

REPRODUCTIVE SUMMARY OF TOTAL HERD		REPRODUCTIVE SUMMARY OF TOTAL HERD		REPRODUCTIVE SUMMARY OF TOTAL HERD	
NO. COWS	NO. CALVES	NO. COWS	NO. CALVES	NO. COWS	NO. CALVES
8	21	10	16	17	17
8	21	10	16	17	17

GENERAL MANAGEMENT INFORMATION

GENERAL MANAGEMENT INFORMATION		GENERAL MANAGEMENT INFORMATION		GENERAL MANAGEMENT INFORMATION	
NO. COWS	NO. CALVES	NO. COWS	NO. CALVES	NO. COWS	NO. CALVES
8	21	10	16	17	17
8	21	10	16	17	17

STAGE OF LACTATION PROFILE

STAGE OF LACTATION PROFILE		STAGE OF LACTATION PROFILE		STAGE OF LACTATION PROFILE	
NO. COWS	NO. CALVES	NO. COWS	NO. CALVES	NO. COWS	NO. CALVES
8	21	10	16	17	17
8	21	10	16	17	17

YEARLY PRODUCTION AND MASTITIS SUMMARY

YEARLY PRODUCTION AND MASTITIS SUMMARY		YEARLY PRODUCTION AND MASTITIS SUMMARY		YEARLY PRODUCTION AND MASTITIS SUMMARY	
NO. COWS	NO. CALVES	NO. COWS	NO. CALVES	NO. COWS	NO. CALVES
8	21	10	16	17	17
8	21	10	16	17	17

PRODUCTION, INCOME, AND FEED COST SUMMARY

PRODUCTION, INCOME, AND FEED COST SUMMARY		PRODUCTION, INCOME, AND FEED COST SUMMARY		PRODUCTION, INCOME, AND FEED COST SUMMARY	
NO. COWS	NO. CALVES	NO. COWS	NO. CALVES	NO. COWS	NO. CALVES
8	21	10	16	17	17
8	21	10	16	17	17

ASSOCIATION AND FEED CENTER

ASSOCIATION AND FEED CENTER		ASSOCIATION AND FEED CENTER		ASSOCIATION AND FEED CENTER	
NO. COWS	NO. CALVES	NO. COWS	NO. CALVES	NO. COWS	NO. CALVES
8	21	10	16	17	17
8	21	10	16	17	17

GENERAL MANAGEMENT INFORMATION (CONT.)

GENERAL MANAGEMENT INFORMATION		GENERAL MANAGEMENT INFORMATION		GENERAL MANAGEMENT INFORMATION	
NO. COWS	NO. CALVES	NO. COWS	NO. CALVES	NO. COWS	NO. CALVES
8	21	10	16	17	17
8	21	10	16	17	17

ASSOCIATION AND FEED CENTER (CONT.)

ASSOCIATION AND FEED CENTER		ASSOCIATION AND FEED CENTER		ASSOCIATION AND FEED CENTER	
NO. COWS	NO. CALVES	NO. COWS	NO. CALVES	NO. COWS	NO. CALVES
8	21	10	16	17	17
8	21	10	16	17	17

ASSOCIATION AND FEED CENTER (CONT.)

ASSOCIATION AND FEED CENTER		ASSOCIATION AND FEED CENTER		ASSOCIATION AND FEED CENTER	
NO. COWS	NO. CALVES	NO. COWS	NO. CALVES	NO. COWS	NO. CALVES
8	21	10	16	17	17
8	21	10	16	17	17

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APPENDIX FIGURE 3. Herd Summary Averages For 168 Holstein Herds With RHA's of 20,000 or More.

HERD SUMMARY		NAME AND ADDRESS	
TYPE OF RECORD AND HERD CODE		HOLSTEIN HERDS	
NO. HERDS = 168		ROLLING HERD AVERAGE > 19999	
PRODUCTION, INCOME, AND FEED COST SUMMARY			
DESCRIPTION	DAILY AVERAGE PER COW ON TEST DAY	ROLLING YEARLY HERD AVERAGES	
TOTAL COWS	103	98.6	
COWS IN MILK	88	87.7	
MILK LBS. (ALL COWS)	52.1	21,075	
B.FAT LBS. (ALL COWS)	1.85	746	
B.FAT PERCENT	3.6	3.5	
PROTEIN LBS. (ALL COWS)	1.64	659	
PROTEIN PERCENT	3.2	3.1	
MILK LBS. (MILKING COWS)	62.1	11,002	
SILAGE	29	17	
OTHER SUCROSE'S OR BLENDED PASTURE	13	8	
OTHER SUCROSE'S OR BLENDED PASTURE	9	10	
OTHER FEEDS	1	1	
PASTURE	5	29	
CONCENTRATES	19	35	
VALUE OF PRODUCT \$	6.66	2,633	
COST OF CONCENTRATES \$	1.39	497	
TOTAL FEED COST \$	2.58	927	
INCOME OVER FEED COST \$	4.08	1,706	
FEED COST PER CWT. MILK \$	4.95	4.40	
MILK BLEND PRICE	12.74	12.48	
ASSOC. MILK LAB	MAINT. RECEIVED	PROCESSING CENTER	MAINT. RECEIVED
RECIPT. DAY	MO. DAY	RECIPT. DAY	MO. DAY

STAGE OF LACTATION PROFILE		REPRODUCTIVE SUMMARY OF TOTAL HERD	
STAGE OF LACTATION (DAYS)	NUMBER OF COWS	AVG. DAILY MILK LBS.	AVG. DAILY MILK % FAT
1-30	14	10	3.6
31-60	8	9	2.3
61-90	4	5	2.7
91-120	4	5	3.9
121-150	4	5	2.7
151-180	4	5	3.6
181-210	4	5	2.3
211-240	4	5	2.3
241-270	4	5	2.3
271-300	4	5	2.3

GENERAL MANAGEMENT INFORMATION		REPRODUCTIVE SUMMARY OF TOTAL HERD	
GENERAL MANAGEMENT INFORMATION	REPRODUCTIVE SUMMARY OF TOTAL HERD	REPRODUCTIVE SUMMARY OF TOTAL HERD	REPRODUCTIVE SUMMARY OF TOTAL HERD
NOV	DEC	JAN	FEB
89	90	91	92
14	13	12	10
1	7	6	6
1	1	1	1
1310	5297		

YEARLY PRODUCTION AND MASTITIS SUMMARY		YEARLY SUMMARY OF COWS ENTERING AND LEAVING THE HERD	
DATE OF TEST	NUMBER OF COWS	AVG. DAILY MILK LBS.	AVG. DAILY MILK % FAT
11-85	29	95	64.7
12-85	29	95	66.6
1-86	33	97	67.2
2-86	30	95	67.4
3-86	28	102	67.7
4-86	30	93	68.1
5-86	30	93	68.2
6-86	30	103	65.5
7-86	31	95	62.7
8-86	33	105	63.2
9-86	29	99	63.2
10-86	31	104	62.1
AVERAGES	30	98	65.5

SUMMARY OF CURRENT BREEDING HEED		COWS WITH NO BREEDING DATES ON DAIRY		COWS BEED	
DESIRED NO. DAYS OPEN BEFORE BREEDING	NO. COWS OPEN	NO. COWS OPEN	NO. COWS OPEN	NO. COWS OPEN	NO. COWS OPEN
60	2.6	44	68	20	7
				2	2
				3	3
				3	13
				10	20
				15	15

TABLE 4. Top Ten Management Variables For Predicting Current Rolling Herd Average Milk.

Management Variable	Accumulative R SQUARE	Independent R SQUARE	Linear Change In Milk Per Unit Change In Mgmt. Variable
Percent cows with sire identity	0.233	0.233	35
Percent cows in milk	0.356	0.209	326
Average linear SCC score	0.416	0.123	-1053
Average days in milk	0.447	0.002	-5
Average PD\$\$ of sires	0.473	0.140	31
Average lbs. concentrate fed	0.492	0.034	0.21
Heat detection efficiency	0.500	0.129	50
Percent SCC Score 4&5	0.506	0.055	-40
Percent left herd (all other reasons)	0.510	0.016	18
Average days dry	0.515	0.147	-77

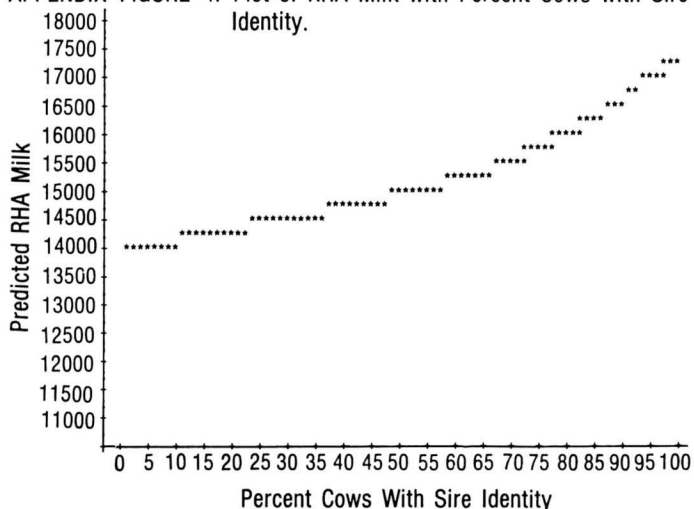
R SQUARE for all 18 management variables studied was 0.521.

TABLE 5. Top Ten Management Variables For Predicting Change In Rolling Herd Average Milk (This Year — Last Year).

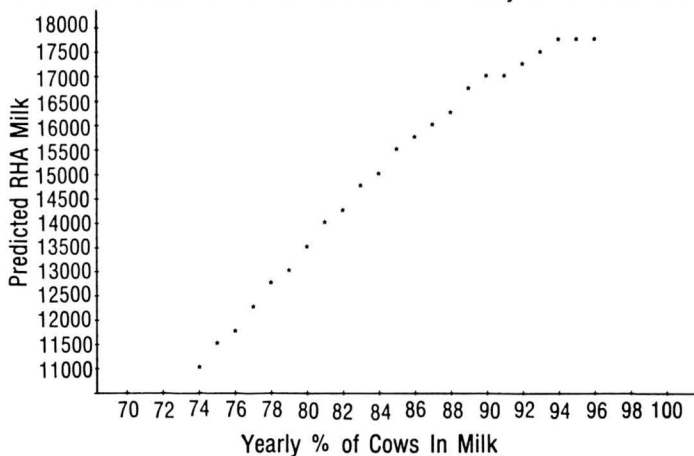
Management Variable	Accumulative R SQUARE	Independent R SQUARE	Linear Change In Milk Per Unit Change In Mgmt. Variable
Percent cows in milk	0.180	0.180	157
Average days in milk	0.252	0.037	-13
Average linear SCC score	0.267	0.020	-350
Heat detection efficiency	0.278	0.017	14
Percent left herd (low production)	0.283	0.001	-5
Percent cows with sire identity	0.288	0.006	10
Average lbs. concentrate fed	0.292	0.009	0.05
Percent breedings successful	0.296	0.016	-15
Herd Size	0.299	0.02	-3
Percent left herd (all other reasons)	0.301	0.003	-4

R SQUARE for all 18 management variables studied was 0.306.

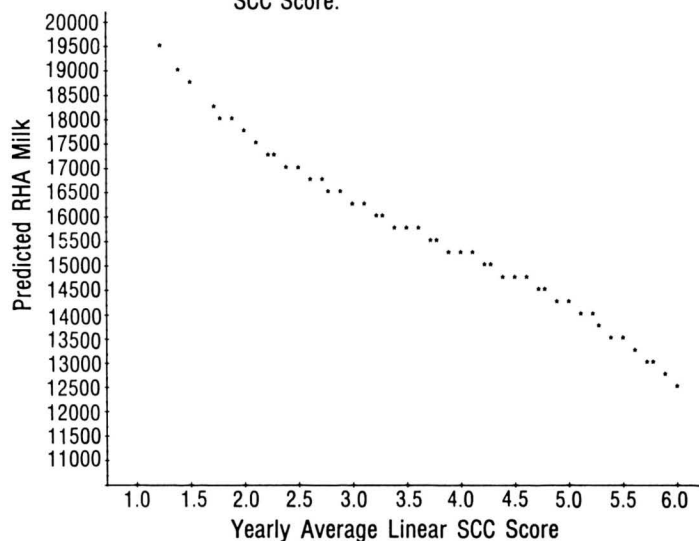
APPENDIX FIGURE 4. Plot of RHA Milk with Percent Cows with Sire Identity.



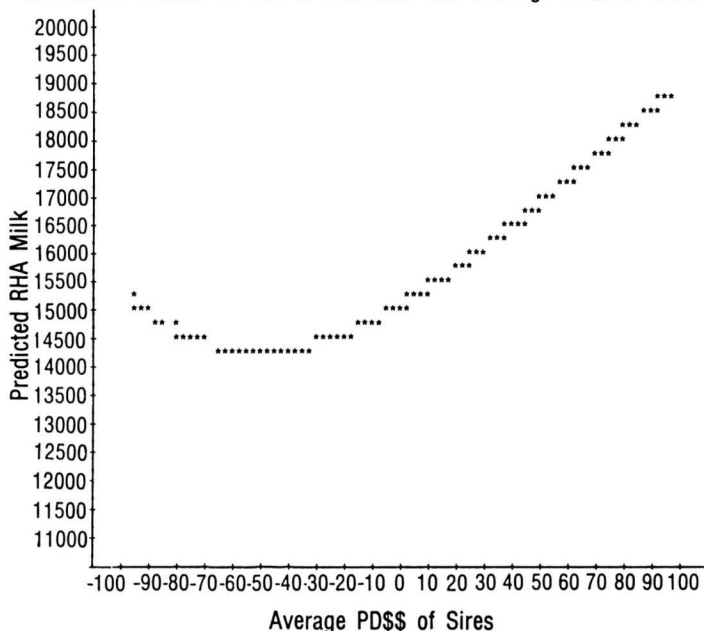
APPENDIX FIGURE 5. Plot of RHA Milk with Yearly % Cows in Milk.



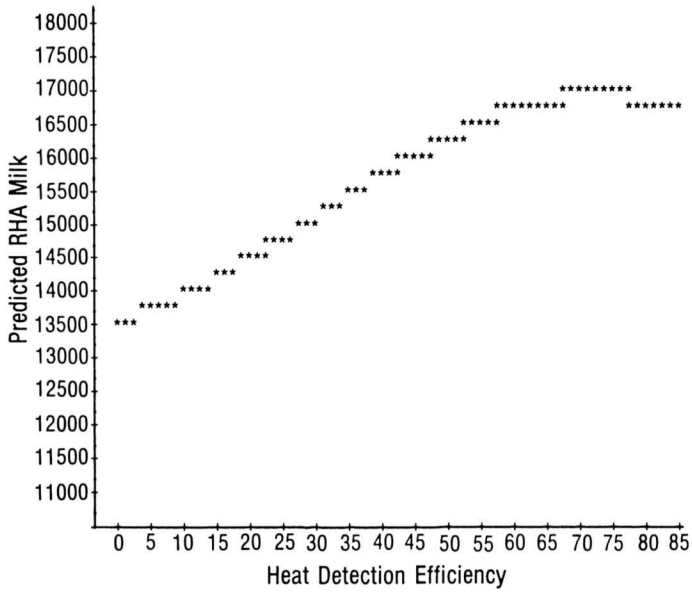
APPENDIX FIGURE 6. Plot of RHA Milk with Yearly Average Linear SCC Score.



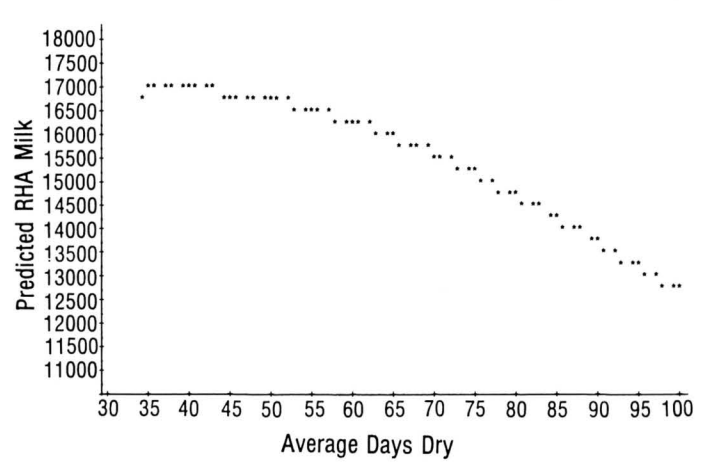
APPENDIX FIGURE 7. Plot of RHA Milk with Average PD\$\$ of Sires.



APPENDIX FIGURE 8. Plot of RHA Milk with Heat Detection Efficiency.



APPENDIX FIGURE 9. Plot of RHA Milk with Average Days Dry.



APPENDIX FIGURE 10. Plot of RHA Milk with Yearly Average % SCC Score 0-3.

