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

						REPRO	ODUCTIV	E SUN	MARY	′					
GROUP	REPLACE- MENT	PRODUCIN	G FEMALES	NO OF	ANIMALS	OPEN	AVG. DAYS	NO OF ANIMALS BRED			DAYS TO	BREED	DING INTER	VAL	DAYS MINIMUM FRESHENING
GROUP	FEMALES	NUMBER	AVG DAYS SINCE FRESH	< 60 DAYS	60-120 DAYS	> 120 DAYS	OPEN	ONCE	TWICE	3+ TIMES	BRED	< DAYS	18-24 DAYS	> 24 DAYS	INTERVAL
PREGNANT	25							14	10	1		1	10		
PREGNANT		36	302	2	26	8	107	22	5	9	68	1	12	1	385
POSSIBLY	6							3	2				2		
PREGNANT		21	144		17	4	101	9	8	4	72		12		379
OPEN	46							TOTAL A	N:MALS	88	AVERAGE	SERVICES	REPLAC MENT		DUCING TOTAL
J. 214		22	76	10	10	2	76	TOTAL S	SERVICES	150	PER CON	CEPTION	1.	4	1.8 1.7

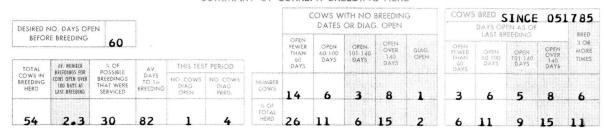
DRY DAYS SUMMARY											
NUMBER < 40	NUMBER 40-70	NUMBER > 70		AVG DAYS DRY							
8	36	7	51	52							

Minnesota DPRC

		REPRO	DUCTIV	E SUM	MARY			
	NUMBER COWS	DAYS SINCE CALVING	DAYS TO IST HEAT	DAYS TO 1ST BREEDING	DAYS OPEN	SERVICES PER CONCEPTION	EXTENDED	MINIMUM CALVING INTERVAL MONTHS
PREGNANT COWS	22	253	90	90	106	1.5	2	12.7
POSSIBLY PREGNANT	5	94	65	65	7 0	1.2		11.5
PROBLEM COWS	3	168	122	122	151	2.0	2	14.1
MAX CONCEPT	TION RATE	HEAT DETEC	TION INDEX	COMS IN	HEAT BY	O DAYS	REPEAT E	REEDERS
67	8	6	5%		23%		1	3%

DRPC @ Raleigh

SUMMARY OF CURRENT BREEDING HERD



REPRODUCTIVE SUMMARY OF TOTAL HERD

	DAYS	OPEN A	T 1st BREE	DING
	OPEN FEWER THAN 50 DAYS	OPEN 50 80 DAYS	OPEN 81-100 DAYS	OPEN OVER 100 DAYS
NUMBER COWS	10	31	13	18
% OF TOTAL HERD	q .	29	12	17

86	42	4	24	50	22	13.6	134	54	1.8	55	+90	176	50	2.0	55
BREED ING	THAT WERE SERVICED	LESS THAN 18	18 to 24	GREATER THAN 24	COWS	CALVING	OPEN	COWS	FOR PREG COWS	NUMBER	AVERAGE PD \$5	BREED	SUCC ESSFUL	PER CONCEP TION	CONCEP TION RATE
DAYS POSSIBLE BREED-	POSSIBLE	HE	REEDINGS (ALS	% PROB	CALVING	AVG DAYS	TOTAL PREG	AVG NO BREED INGS	SERVI	TARY OF CE SIRES I PO SS	BREEDING	SS FOR F	NUMBER BREED	l st BREED

TABLE 1. Reasonable Goals For Several Reproductive Management

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 Holste Detection Efficiency.	in herds selected	using Heat

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 computerprocessed 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

				EREN	ICE	DATE 1118		PAGE	1								
07 — COW	COWS FOR SPEC	REPROD DAYS	SVC		C	(CONDEN BRED-	SED PRIN	CURR	R	MOST R	ECENT	HE/	ALTH CODE	FIRST	PRIOR H	ΙEΑ	LTH CODE
BARN	MNGMT	IN	HEAT	NO	D	HEAT	CARR	T.D.	A		LIFET	IMI			LIFET	IMI	E
NAME	PROB	MILK	INT.	BR	E	DATE	CALF	MILK	T	MMDDYY	CODE	T	REMARKS	MMDDYY	CODE	T	REMARKS
31		101			Н	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									
107		115		1		11-09	10			022984	OTRA		SLPUS5EV				
115		112		1		9-29	51	58.0		072086	CDIF		MILK FEV				
126		248	58	4		11-11	8	35.8	C	052186	PY0M		LUT, NOL	040286	PYOM		LUT
127		31						66.5		012286	OTRA	Ν	LRG OV DUC	011286	OTRA	N	GNRH
131		66		1		11-08	11	85.0		112785			SL-LUT	100785	RETP	N	PEN
144		182	50	5		11-05	14	46.0	C	071385	MRFQ	N	TOD				
154		48	18		Н	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	В	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	Α	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		SL, LUT	070786	MLRQ	N	AMOX, K
170		21	-					82.5		082086			AMOX	081585	RETP		POLY
188		16						73.5		082284	PYOM		LUT				
208		134	46	3		11-13	6	66.5	Α	111185	MRFQ			062685	PYOM	N	EV
210		85		-				64.5						00000			
239		260	22	5		11-10	9	42.8		032686	PY0M	N	SL-HEAT	030786	RETP	N	EV-LUT-P0
240		203	100	2		11-14	5	47.3						000.00			2. 20 0
243	E-RAT	75		1		10-23	27	48.8		091086	MAST	N	CEF	121785	OTRA	N	CYS@Breed
245	L 1011	115	20	3		11-09	10	60.8		001000	1111/101	•••	021	121100	011111	•••	010@81000
249		215	51	3		10-27	23	40.6		070886	MLRQ	N	TOD	052186	CYST	N	RUPTURED
263	E-RAT	98	27	·	Н	9-21		67.3		101185			OXYTET	002100	0.01		HOI TOILED
264	LIMI	143	48	1	• • •	11-14	5			072386			EV, L2WK	062986	RETP	N	EV, LUT
271		129	40	i		10-10	40	50.0		082586			LUT+L2WK	072386	PYOM		EV, PO3X
286		25		'		10 10	40	78.8	U	082985	PYOM			072000	1 TOW	14	LV, TOOK
287		86		1		10-31	19	60.0	R	030386	MLRQ			072485	PYOM	M	EV-POLY
291		146	22	2		11-13	6	63.3		092486	CYST		GNRH	091286	LAME		PEN, ABSS
293		111	22	1		11-13	5	55.5		092585	CYST		GNRH	031200	LAIVIE	14	FLIN, ADOS
302		192	55	1	N	8-29	5	65.3		072386			FIX TEAR	070286	PYOM	N	SL, TEAR, LU
304	E-RAT	28	55	- 1	11	0-29		72.5		011286	OTRA		GNRH	070286	CYST		GNRH
305	E-NAT	28 54						97.5		121885	CYST		GNRH	092303	0131	IV	GINNI
310			41	4		10-22	28	49.8	D	121000	0131	IV	GINNE				
312		103	41	1	Ц	11-10	20			101386	MACT	A1	AMOV V	010206	OTRA	N	CNDL
312		38			Н	11-10		42.0		101366	MASI	IA	AMOX, K	010386	UIKA	N	GNRH

is also availabe 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.

	** Routin	e Preg. ** nosis **	
Management Variable	Yes	No	Difference
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
- (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

	Rolling Herd Average Milk Production										
Management Factor	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 R² 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 (R² 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 $\frac{1}{2}$ 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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HERD SUMMARY WILK BLEND TOTAL COST OF CONCENTRATES S CONCENTRATES DRY FORAGE PROTEIN PERCENT PROTEIN LBS. IALL COWS STEAT PERCENT B'FAT LBS. MILK LBS. ALL TOTAL COWS /ALUE OF PRODUCT \$ OTHER FEEDS PRODUCTION, INCOME, AND FEED COST SUMMARY TENDED RATION COST PER CWT. MILK SUPV FEED COST TYPE OF RECORD MILK ALL COWS PEED COST MIK LAB PROCESSING CENTER

RECEIVED MALED RECEIVED MATERIAL RESULTS MATERIAL RECEIVED MATERIAL RESULTS MATER PRICE SMOS NO. 13.24 3.5 OTHE SOURCE 129 DAILY AVERAGE PER 107 83 10 49.7 39.9 HERDS=1976 5.28 MO 5.58 3.05 2.23 1.22 3.2 1.26 3.6 1.42 DATE DHI-202 TOR VALUE 22 71 £43 40 30 m Q > 0 11,782 108.6 3,532 2,218 12.93 6,488 ROLLING YEARLY HERD AVERAGES ROUTINE PREGNANCY CHECKS 124.9 HOLSTEIN HERDS 16,330 1,280 141 2,113 5.10 458 3.6 566 35 70 02 67 AVERAGES CALF CALF LACIS 200-305 GREATER DATE OF TEST COWS FOR ALL F 11-85 12-85 1-86 2-86 3-86 5-86 5-86 6-86 129 86 43 SMC) 40 GRWON STAGE OF COWS COWS DAYS OPEN AT I 10 DAYS SAVO 49 co FOT FOTOLINE 36 72 59 76 PROS HERD ON TEST DAY 124 17840 12 SAT'S 17251 15 COWS IN BREEDING DESIRED NO. DAYS OPEN BEFORE BREEDING MICK MILK N 78 OVER 100 DAYS 154 157 157 162 169 185 188 188 179 169 31 4.2 34 2.9 41 4.1 55 3.0 64 3.4 50 2.9 622 607 FAT DWS. 54.0 48.7 85 DRY COMS 10 CALVE HEMERS TO CALVE 65 67 SIRE ID N OF POSSIBLE BREEDINGS THAT WERE SERVICED 64 39 MERE THAT WERED INGS TEST PERIOD PERIOD 47 101 YEARLY PRODUCTION AND MASTITIS SUMMARY AVG PD 55 OF SIRES OF COWS +31 +51 50 710 ADN GENERAL MANAGEMENT INFORMATION REPRODUCTIVE SUMMARY OF TOTAL HERD 82 49 68 39 THIS TEST PERIOD XXW 35 41 24 N 5 00 SUMMARY OF CURRENT BREEDING HERD 19.747 8 10 GREATER THAN 24 5 65 10 8 w K PROL 116 COARS LEW BOS TOTAL HERD 50 44 0 NICKING HERD 13.4 16337 16341 16289 16268 16245 16356 MEX 33 26 THAN DAYS 39 34 DATES OR DIAG. OPEN YEARLY SUMMARY OF COWS ENTERING AND LEAVING THE HERD OPEN DAYS 126 DAYS OPEN 113 16 FAT 584 584 585 587 587 588 588 588 588 12 3 -OPEN OATS FREG NANT PROT 33 24 50 9 1.9 SWCO SWCO NOS NOS NOS AGC% N DAMO. 5070 57 +106 SUN OF TEST SAY MAIN WITS (DAS) 6 9 DATS DATS 10 4 BRED 10 \$4YQ 001:00 DAYS SON SERVIN 13 DRY 239 42 CSIG WILKING TIMES 2.4 13 53 RUMBER BREEDINGS FOR DAYS DAYS 6 PM BREED ING CONCE TION S OR 244444444 DAYS DAYS

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

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APPENDIX FIGURE 2. Herd Summary Averages For 3,085 Holstein Herds Not On Routine Pregnancy Diagnosis. 61 3022522508 3 OR MORE 25 P.R. BEKING TIMES 5.0 222453100073 HPLED TEST : NUMBER Zado Sy va 13 YEARLY SUMMARY OF COWS ENTERING AND LEAVING THE HERD 27 101-140 9AYS 148 7.80 99 OFFIN Sp. 196 DATS 0 5 2 9 COWS BRED 16+ 8 63 m 2 2 3593 40 NUMBER! 35 35 35 35 21 COWS WITH NO BREEDING DATES OR DIAG. OPEN 1.8 SUMMARY OF CURRENT BREEDING HERD AVERACE BOOK WI 1815 10 18 OVER 140 DATS 505 39 30 1089 74 33 25 to 25 OPEN 01-140 DAYS • 5 NAMES NAMES COWES YEARLY PRODUCTION AND MASTITIS SUMMARY APR 83 REPRODUCTIVE SUMMARY OF TOTAL HERD 544 ထ 23 31 ROLLING YEARLY HERD AVERAGE 13.8 140 GENERAL MANAGEMENT INFORMATION FAT. OPEN PAYS DAYS 13 AVG. DAYS MILKING, DRY, CALVING, BY MONTH 15188 15182 3 37 MAR 11 32 18 32 OPEN FWER HAN SO DAYS COWS (NIERING HE MILK 2 24 3.1 COWS * SONO 43 37 10 10 4 40 13 13 3.5 38 S FA3 JAN 13 4 THIS YEST PERIOD BREEDINGS OR HEAT INTERVALS 40.7 31 COWS TO BE 227 MIK 14 9 DEC 19 * 2 99 AV DAYS TO 1:0 LESS THAN 83 AVG. PO SS OF SIRES OF COWS +42 +13 +25 101 N OF OSSIBLE BREED INGS THAT WERE TEST FERIOD PERSIST. % OF POSSIBLE PREEDINGS THAT WERE SERVICED 36 52 DRY COWS WITH SIRE ID 26 52 54 48.5 49.3 46.2 40.0 46.6 88 DESIRED NO. DAYS OPEN BEFORE BREEDING AV DAYS TO TO TO SREED. 26 NOBBO BREEDINGS FOR CONS. SPORE DIVER LIGHT REFERRISE USCY REFERRISE TEST DAY AVERAGES (MEKING COWS) MIK 578 563 584 FAT 32 32 51 43 19 172 11 91 DAYS IN TOTA! COWS IN BREEDING HERD A SORE STAGE OF LACTATION PROFILE 26 16040 16417 16586 MILK 040000 OPEN 81.100 DAYS 1 10 NUMBER COWS IN HERD ON PEAK TEST DAY 73 89 55 22 SO-BO DAYS 21 AVERAGE DAYS IN TEST PERIOD 31 58 62 51 PEWER THAN D DAYS æ COWS HERDS NOT ON ROUNTINE PREGNANCY CHECKS OF COWS 30 65 95 NUMBER TOTAL HERD STAGE OF 100.199 DATE OF TEST 306 AND GREATER 200-305 HOLSTEIN HERDS 37 PRODUCTION, INCOME, AND FEED COST SUMMARY 86 2, 789 11 ROLLING YEARLY HERD AVERAGES 5.10 93.7 3.6 448 1,146 244 505 1,920 774 15,181 10, 162 is consume 12.63 MO. DAY 117 6,180 2,051 80.5 | MILK 1.AB | PROCESSING CENTER | RECEIVED | RAMIED | RECEIVED | RECEIVED | RECEIVED | RECEIVED | RAMIED | RAM HERDS=3085 TON VALUE 40 TOP VALUE 27 22 US CHASHED TON YALVE 43 34 5.46 12.93 3.5 DAILY AVERAGE PER 1.19 2.06 2.80 MO. DAY 1.33 1.20 4.86 83 3.6 9.94 37.7 51 17 KUREE NO. HERD NO HERD SUMMARY (ALL COWS OF RECORD VALUE OF PRODUCT PRED COST PER CWT, MILK BYFAT LBS. (ALL COWS) INCOME OVER FEED COST MILK LBS, (ALL COWS) COST OF CONCENTRATES MILK BLEND PRICE TOTAL FEED COST OTHER SUCCULENTS OR BLENDED RATION DESCRIPTION PROTEIN PERCENT MILKING CONCENTRATES 00 COWS IN MILK B'FAT PERCENT PROTEIN LBS. TOTAL COWS DRY FORAGE OTHER FEEDS SUPV. AND MIK LBS. PASTURE SILAGE

SUPV. MO. DAY MO	RECEIVED	MILK BLEND PRICE	FEED COST PER CWT. MILK \$	INCOME OVER REED COST \$	TOTAL FEED COST \$	COST OF CONCENTRATES \$	VACUE OF PRODUCT \$	CONCERNENCE	CONCENTRACE	PASTURE	OTHER FEEDS	ORY FORAGE	OTHER SUCCUENTS OR	MICK LBS. MILKING COWS)	PROTEIN PERCENT	PROTEIN LBS. (ALL COWS)	B'FAT PERCENT	B'FAT LBS. (ALL COWS)	MILK LBS. (ALL COWS)	COWS IN MILK	TOTAL COWS	DESCRIPTION	PRODUCTION, INCOME, AND FEED	N	55 CO HERD NO.	TYPE OF RECORD	
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TABLE 4. Top Ten Management Variables For Predicting Current Rolling Herd Average Milk.

			ear Change In Milk Per Init Change
Management Variable	Accumulative R SQUARE	Independent R SQUARE	In Mgnt. 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).

		Li	inear Change In Milk Per Unit Change
Management Variable	Accumulative R SQUARE	Independen R SQUARE	
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	n) 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 manag	ement variabl	les studied	was 0.306.

APPENDIX FIGURE 4. Plot of RHA Milk with Percent Cows with Sire 18000 Identity. 17500 17000 16500 16000 15500 15000 Predicted RHA 14500 14000 13500 13000 12500 12000 11500

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

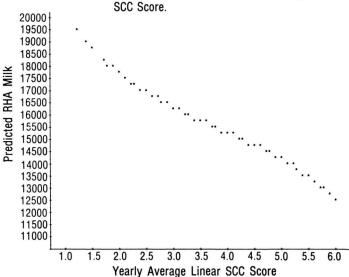
Percent Cows With Sire Identity

11000

APPENDIX FIGURE 5. Plot of RHA Milk with Yearly % Cows in Milk. 18000 17500 17000 ¥ 16500 16000 王 15500 15000 14500 Predicted 14000 13500 13000 12500 12000 11500 11000 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100

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

Yearly % of Cows In Milk



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

