

**TOPIC: THE EFFECT OF LENGTH OF DRY
PERIOD, LACTATION LENGTH AND CALVING
INTERVAL ON SUBSEQUENT LACTATION YIELD.**

**A thesis presented to the School of Agricultural Sciences in partial
fulfilment of the award of the bachelors of Science in Agric.**

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ABSTRACT

This research was conducted to find out the effects of the length of dry periods (DD), lactation length (DL), season of calving (SC), parity (P) and calving interval (CI) on the subsequent milk yield of the cows in Palabana.

Data was collected from Palabana Dairy Training Institute. The data was stretching over a period of ten years (from 1990 to 2001) and was for 60 cows each consisting of a set of data the parameters under study.

The data was analysed using MINITAB 14 regression equations and the analysis of variance (ANOVA).

From the data collected the following conclusions were made:

The average milk yields were 2955.3 Kg, 3540.9 Kg, 3432.4 Kg, 3124.6 Kg and 3137.1 Kg for parities 1, 2, 3, 4 and 5 respectively. This was in agreement with what Mwenya and Shandomo found out in 1993.

R^2 indicated that for parity 1, 54% of the milk yield was contributed by CI, DD and the SC. Parity 2 had 62 % contribution from all the parameters. Parity 3 had 39.2% contribution from CI, DD and SC. Parity 4 had 33% contribution from CI, DD and SC. While for parity 5, 59% contribution came from LL and CI.

DEDICATION

To my loving and always caring family. Thank you for being around me in dark and light moments. I love you all.

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CHAPTER 1

INTRODUCTION

Dairy farming is one of the most challenging agricultural activities in Zambia today with a potential to increase income and improve milk utilization as a complete dietary protein for the farmer and the surrounding communities.

Zambia imported most of its milk and milk by-products due the low productivity of the dairy sector. This low productivity is due to the inherently low yields from the local cows, lack of enterprise advisory services and low animal husbandry practices.

Over the years, the demand for milk in Zambia has been greater than the local supply, so imports are used to meet the deficit. The growth in population has been greater than the growth in milk output. The situation indicates a serious need to increase milk production in Zambia.

In this regard, the government in the 1970s and 1980s operate a number of programmes aimed at developing the smallholder dairy sector. These included; the rural milk development scheme in 1969, the dairy settlement scheme in 1971, the small urban dairy units in 1978 and the smallholder development project in 1981.

During the early 1970s, however, government had to reduce its support to the smallholder dairy sector because of economic difficulties and budgetary deficit.

Furthermore, in 1991, the macro-economic reforms brought about liberalization, privatization and commercialization of the agriculture services and this led to the privatization of the functions of the smallholder dairy management unit, which led to farmers having trouble in accessing technical services.

To help solve this problem, Livestock Development Centers and Palabana dairy training institute are developing crosses of dairy cows. This is in an attempt to develop suitable breeds for milk production.

Dairying with crossbred cows has been shown to substantially increase milk production and the farmers' income if appropriate agro- climatic condition and market access are present..

The motivation for using crossbred cows for milk production is that, crossbred cows combine the milking ability of the *bos taurus* cattle and the resistance to tick-borne of the *bos indicus* cattle.

The many factors that affect the production of milk being; the type of breed, poor animal husbandry practices, poor nutrition, diseases, etc. this paper reports on the estimates of lactating length, dry period, calving interval, parities and season of calving their effect on milk production.

PROBLEM STATEMENT

The timing of the lactation length, dry days, season of calving and the calving interval affect milk yields. Therefore, these parameters need to be well understood and well controlled in order to increase milk yields.

OBJECTIVES

To examine the lactation performance of crossbred dairy cattle at Palabana Dairy Training Institute.

SPECIFIC OBJECTIVES

- To evaluate the effect of the calving season and the parity number on the subsequent milk yields.
- To evaluate the effect of dry period, lactation length and calving interval on the milk yields.

CHAPTER 2

LITERATURE REVIEW

Milk production within a breed is a function of many traits, such as age at first calving, calving interval, milk yield per lactation and lactation length. Parameters estimates of these traits are important for breeding and management decisions. Many workers have investigated these problems in some tropical countries and this work has been reviewed by Mukasa (1989).

The importance of these traits with respect to breeding and management has also been discussed by other workers, for example McDowell (1972)

Under skilful management milk yield is at its maximum at about 50 days after calving. The cow calves with a daily yield of roughly 85% of her maximum while the yield falls to rather less than half the peak level by the end of the 10 months lactation. Nutrition requirements for production are therefore at their greatest during the first third of the lactation, and requirements for development of the foetus are greatest when milk production has ceased. The nutritive demand can more easily match available grazing when cows calve in good condition at the commencement of the rain season and have the benefit of high protein intake early in their lactation. Reasonable levels of carbohydrates and more energy can be made available in the process of milking off her back. Seasonal calving in the rains is particularly attractive when applied in medium-to-high rainfall zones where rainfall is also more reliable (Barrett 1979).

Calving at the start of the rain season ensures the best support for milk from grazing, with the fall in quality of grass following the cow's normal lactative curve. The lactation is almost over when the grazing value is at its lowest. The need for concentrate supplements at this time is re-emphasised and they are clearly essential to a seasonal calving programme. Seasonal calving in the dry season need the utmost use of the rains in

February so that the cows' in-calf drops their calves in November when the milk will be most wanted.

The alternative to seasonal calving involves the need to maintain a steady year-round supply of feed by a combination of grazing and conserved fodder. Because grass is the major economic source of feed, the farmer aims at an average production approaching, but not greatly in excess of the 14 Kg peak obtained from good grass at its best, and attempts to hold that level throughout the year. The problem is largely one of maintaining the protein level while assuming that energy content and digestibility of the diet do not fall unduly.

The success of feeding methods is measured by the production and fertility records, and the condition and yield of individual cows. Total herd yield should remain more or less constant, depending on the spread of calving through the year, and cows that have calved about two months should be yielding steadily around the 14 Kg mark without losing condition (Barret, 1979).

Milk production normally follows pregnancy and calving. The duration of pregnancy in the cow is normally 280 days rather longer in the tropics, followed by a lactation of 10 months (305 days). After the lactation period practical experience has determined the desirability of a 6 to 8 weeks dry period. As by no means 100% of services, later on inseminations, are infertile, the farmer usually allows the cow to be served 40 to 60 days after calving (Barret, 1979).

A cow reaches her production peak at approximately 3 to 6 weeks after parturition, and the gradually decline in milk yield take place. This should also consider the yearly calving interval which is generally the desired frequency of economic daily farming (Dalton, 1985).

A good condition at calving and an adequate feeding programme after calving tend to increase peak milk production. Peak milk production tends to play an important role in determining lactation milk production, since there is a high correlation between these two factors. Cows must have a high persistency and high peak milk production for high-

lactation milk yield. There is general inverse relationship between milk yield and protein and milk fat percent. As milk yield increase, the percentage of the two elements decrease as illustrated below (Dalton, 1985):

Both milk yield and percent composition of milk vary considerably from day to day. Daily variations in milk are related to incompleteness of udder evacuation of milk. Variation due to disease, under nutrition, cows being off-feed and related factors are usually of longer duration than those caused by udder evacuation, incomplete milking, oestrus or excitement. High yield as a result of day variations are accompanied by increase in the milk-fat percentage while low yields are accompanied by low milk-fat content, this is because fore milk be as low as 1% milk fat, whereas last drawn milk will be as high as 8 to 15% milk fat, next milking will be issue more milk fat content as left over from previous milking (Thomas 1983).

Length of the dry period and body conditions at calving are related. Cows must be in good condition at calving and must have had dry period to attain maximum production. Cows in good condition at calving have a slightly higher milk-fat % than those in fair or poor body condition.

The dry period is important for replenishing body supplies if the cow is in poor body condition at calving. Cows also need the dry period to regenerate secretory tissue.

An increase in milk yield results with dry periods up to about 60 days (Coulon, 1994).

It is well known that cows produce more milk as they become older. First lactation cows freshening at 24 months of age produce about 75% of milk produced by mature cows. At 3 years they increase to 85% and then 92% at 4 and 5 years respectively. However, there are some variations among breeds.

In addition to increase in milk production with age, there is a slight decrease in non fat solids and milk fat % though the fifth lactation, beyond which there is little change (Dalton, 1985).

A general relationship exists between the weight of cows and amount of milk produced. Larger cows have more udder secretory tissue and larger digestive system. The energy

required for the maintenance of the cow is proportional to the size of the cow (body weight 0.73). Therefore, two cows (360 Kg each) produce more milk than a 720Kg cow. But maintenance of two cows will be higher than the 720Kg cow (Aston, 1994).

A boost in milk production occurs when the cows are turned out on pastures. This boost occurs during the declining phase of lactation and has a significant effect on lactation milk yield. The cows are also dry during part of the summer, when high environmental temperature and poor feeding cause a decrease in milk production (Coulon, 1994).

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Length of dry period and body condition at calving are related. Cows must be in a good condition at calving and must have had a dry period to attain maximum production. Cows in good condition at calving have a slightly higher milk fat % than those in fair or poor condition. The dry period is important for replenishing body supplies if the cow is in poor body condition at calving. Cows also need the dry period to regenerate secretory tissue. An increase in milk yield results with dry period up to about 60 days (Schmidt 1988).

CHAPTER 3

MATERIALS AND METHODS

Six hundred and seventy-five records of cows with parities 1, 2, 3, 4 and 5 were collected from Palabana dairy training institute in Lusaka in order to evaluate the effect of dry days (DD), lactation length (DL), calving interval (CI) and seasonal calving (SC) on the subsequent milk yields. The cows were group according to the number of calvings they have had during the period between 1990 and 2002. Palabana is situated between 14 and 16 degrees latitudes. The climate and vegetation are sub-tropical. There are three seasons, namely; warm wet season (November to April) cool dry season (May to August) and hot dry season (September to October). The average temperature range between 15 and 32 degrees Celsius. Average annual rainfall is 800mm. The vegetation is savanna woodland which consists of a mixture of various trees, shrubs and tall grasses.

The data collected was analyzed using Minitab statistical package. The regression equation and analysis of variance (ANOVA) was used. The level of confidence use was $p > 0.05$ for all the data sets.

$$Y = x_0 + x_1DL + x_2DD + x_3CI + x_4SC + E$$

Where;

Y – Milk yield

DL – days in lactation

DD - dry days

CI – calving interval

SC – season of calving

E – Random error

CHAPTER 4

RESULTS AND DISCUSSION

Regression Analysis: MILK YIELD versus DAYS IN LACTATION, DRY DAYS, CALVING INTERVAL AND SEASON OF CALVING.

Dry days and season of calving had significant ($p > 0.05$) effect on milk yield, while the lactation length had no significant ($p > 0.05$) effect on milk yield.

Result show that these parameters had 54.4% influences on milk yield.

However, due to the much more influence combined of lactation length, the overall analysis of variance show that DD, CI and SC has little influence ($p < 0.05$) on milk yield.

Table1. The effects of DL, CI, DD, parity and SC on milk yield at $p > 0.05$.

PARITY	LACTATION LENGTH (DL)	CALVING INTERVAL (CI)	DRY DAYS (DD)	SEASON OF CALVING (SC)	$p > 0.05$
1	-	*	*	*	-
2	*	*	*	*	*
3	-	*	*	*	-
4	-	*	*	*	-
5	*	*	-	-	-

(*) indicates that the parameter was significant in the contribution to milk yield as determined from the regression equation while (-) indicates that the parameter was not significant.

Table2. The average milk yields, CI, SC, DD and DL for cows in parity 1, 2, 3, 4 and 5.

PARITY	AVERAGE MILK YIELD	CI	DD	DL
1	2955.3	-	-	-
2	3540.9	539.5	136.4	389.7
3	3432.4	449.6	92.2	374.7
4	3124.6	465.8	87.5	358.5
5	3137.1	437.2	77.2	376.8

SEASON OF CALVING

Seasonal calving according to barrette in 1979 should have a serious effect on the milk yields depending on the level of management being employed to the lactating cows. All that is important is that the cows should be adequately fed in order for them to cover up for their maintenance and production or they may loose condition.

The average season mostly noted for best conception is the ending of the rain season when the animals have enough pasture for grazing so that their fertility is increased and they will be calving down just at the beginning of the rain season again.

However, from the regression equation the R^2 shows that at confidence level of 95%, the SC has 54.4%, 62%, 39.2% and 33.0% influence on milk production on the parities 1, 2, 3 and 4 respectively. This shows that SC is a very important parameter to consider for milk production if maximum yields are to be realised.

But due to the other parameters that affect milk yield of which are not considered in this report, the ANOVA suggests that SC has no effect on milk yield ($p < 0.05$). Check appendix1.

LACTATION LENGTH

The length of lactation affects milk yields because it determines the period in which the animal is supposed to be milked. However when the period becomes too long then the milk let down reduces drastically hence becomes uneconomical because the animal is

consuming a lot feed but the returns are low. From the data analysis, 65% and 59.7% of the contributions to milk yield is from DL for parities 2 and 5 respectively. ANOVA for parity 2 shows a significant ($p>0.05$) contribution of DL to milk yield (appendix I). The average length of lactation was found to be 389.7, 374.7, 358.5 and 376.8 for parities 2, 3, 4 and 5 respectively (table 2). This indicated that the DL was longer than the average length which is 305 days. However, this was acceptable for some environments in the tropics due to some variations in climatic factors.

DRY PERIOD

The length of the dry period also is a major contributor to milk yield because it affects the productivity of the cow directly by delaying the start of lactation. The acceptable length of the dry period range from 50 to 90 days on the ideal year of a dairy cow. In this research, 136.4, 92.2, 87.5 and 77.2 days were the averages for parities 2, 3, 4 and 5 respectively. The implication being that 62%, 39.2% and 33% were the contributions to the milk yields for parities 2, 3 and 4 (appendix 1). Approximately, the sum of the dry period and the lactation length should give us the calving interval. If the dry period is too long, then the calving interval will be long too. This will mean delaying the next calf to come.

CALVING INTERVAL

The calving interval is of much more importance here because it affects the production of milk and also the number of calves that are to be given by a cow. The recommended interval is one year plus or minus some days. If a cow has a longer DD or DL the CI is directly affected.

CHAPTER 5

CONCLUSION

The influence of the year and month of calving on milk yield reflects mainly the nutritional differences on pasture which is mainly also influenced by the climatic factors of an area. The major determinant here is the rainfall pattern of a particular area. In Zambia farmers tend to minimize the yearly and monthly variation in available forage by supplementary feeding.

The observed effect of calving in this report is an indication of inadequate supply of supplementary feeding.

In conclusion, the DD, DL, SC, CI and parity have major role to play in influencing the yields of milk that can be gotten from a dairy animal. The figures reflected in this report compares well with those reported from other tropical countries.

RECOMMENDATIONS

The yields of milk can best be achieved by having an ideal calendar of lactation; this means a good management of the parameters discussed in this report. However, in order to maximize profits through milk production, a farmer should also consider improved feeding management. It is noticed in this research that the performance in terms of milk production is much lower compared to the Friesian cattle in temperate countries but is comparable to the average performance of the average performance of Friesian cattle reported in the tropics as noticed by Mwenya and Shandomo 1993.

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APPENDIX 1.

COWS WITH PARITY = 1

Regression Analysis: MILK YIELD versus DAYS IN LACTATION, DRY DAYS, CALVING INTERVAL AND SEASON OF CALVING.

The regression equation is

$$\text{MILK YIELD} = 1418 + 6.78 \text{ DAYS IN LACTATION} - 2.11 \text{ DRY DAYS} \\ - 0.24 \text{ CALVING INTERVAL} - 555 \text{ SEASON OF CALVING}$$

Predictor	Coef	SE Coef	T	P
Constant	1418	1152	1.23	0.234
DAYS IN LACTATION	6.775	1.554	4.36	0.000
DRY DAYS	-2.110	3.148	-0.67	0.511
CALVING INTERVAL	-0.239	1.305	-0.18	0.857
SEASON OF CALVING	-555.1	363.4	-1.53	0.144

S = 748.585 R-Sq = 54.4% R-Sq(adj) = 44.3%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	12050560	3012640	5.38	0.005
Residual Error	18	10086829	560379		
Total	22	22137389			

COWS WITH PARITY = 2

Regression Analysis: MILK YIELD versus DAYS IN LACTATION, DRY DAYS, CALVING INTERVAL AND SEASON OF CALVING.

The regression equation is

$$\text{MILK YIELD} = 3886 + 4.62 \text{ DAYS IN LACTATION} - 0.31 \text{ DRY DAYS} \\ - 3.55 \text{ CALVING INTERVAL} - 135 \text{ SEASON OF CALVING}$$

Predictor	Coef	SE Coef	T	P
Constant	3886	1646	2.36	0.043
DAYS IN LACTATION	4.621	2.477	1.87	0.095
DRY DAYS	-0.307	2.396	-0.13	0.901
CALVING INTERVAL	-3.548	1.797	-1.97	0.080
SEASON OF CALVING	-134.8	394.3	-0.34	0.740

S = 724.759 R-Sq = 62.0% R-Sq(adj) = 45.2%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	7728926	1932232	3.68	0.050
Residual Error	9	4727481	525276		
Total	13	12456407			

All the animals which had calved down to two calves had shown data which was significant ($p > 0.05$) for accepting the hypothesis.

COWS WITH PARITY = 3

Regression Analysis: MILK YIELD versus DAYS IN LACTATION, DRY DAYS, CALVING INTERVAL AND SEASON OF CALVING.

The information provided indicate that the days in lactation were not significant ($p < 0.05$), while the other parameters were significant ($p > 0.05$).

The regression equation is
MILK YIELD = 848 + 8.05 DAYS IN LACTATION - 4.36 DRY DAYS
+ 0.82 CALVING INTERVAL - 335 SEASON OF
CALVING

Predictor	Coef	SE Coef	T	P
Constant	848	1134	0.75	0.461
DAYS IN LACTATION	8.052	2.166	3.72	0.001
DRY DAYS	-4.361	2.714	-1.61	0.121
CALVING INTERVAL	0.817	1.693	0.48	0.633
SEASON OF CALVING	-335.5	263.7	-1.27	0.215

S = 687.675 R-Sq = 39.2% R-Sq(adj) = 29.5%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	7631425	1907856	4.03	0.012
Residual Error	25	11822430	472897		
Total	29	19453855			

COWS WITH PARITY = 4

Regression Analysis: MILK YIELD versus DAYS IN LACTATION, DRY DAYS, CALVING INTERVAL AND SEASONAL OF CALVING.

Only the dry days, calving interval and season of calving were significant ($p > 0.05$) to milk yield

The regression equation is
MILK YIELD = 2360 + 5.75 DAYS IN LACTATION - 3.21 DRY DAYS
- 0.78 CALVING INTERVAL - 434 SEASON OF CALVING

Predictor	Coef	SE Coef	T	P
Constant	2360.2	790.5	2.99	0.004
DAYS IN LACTATION	5.746	1.323	4.34	0.000
DRY DAYS	-3.215	1.891	-1.70	0.096
CALVING INTERVAL	-0.778	1.049	-0.74	0.462
SEASON OF CALVING	-434.4	272.5	-1.59	0.118

S = 957.659 R-Sq = 33.0% R-Sq(adj) = 27.3%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	21260838	5315210	5.80	0.001
Residual Error	47	43104242	917112		
Total	51	64365080			

COWS WITH PARITY = 5

Regression Analysis: MILK YIELD versus DAYS IN LACTATION, DRY DAYS, CALVING INTERVAL AND SEASON OF CALVING.

The regression equation is

$$\text{MILK YIELD} = 3976 + 2.18 \text{ DAYS IN LACTATION} - 9.68 \text{ DRY DAYS} \\ + 1.29 \text{ CALVING INTERVAL} - 868 \text{ SEASON OF CALVING}$$

Predictor	Coef	SE Coef	T	P
Constant	3976.2	908.2	4.38	0.001
DAYS IN LACTATION	2.181	1.746	1.25	0.231
DRY DAYS	-9.683	2.895	-3.35	0.004
CALVING INTERVAL	1.287	1.463	0.88	0.393
SEASON OF CALVING	-868.5	300.5	-2.89	0.011

S = 540.131 R-Sq = 59.7% R-Sq(adj) = 49.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	6490848	1622712	5.56	0.006
Residual Error	15	4376123	291742		
Total	19	10866971			

In this case only the days in lactation and the season of calving were found to have a significant ($p > 0.05$) effect on milk yield, the other parameters were not significant. The information obtained suggests that 59.7% of the contribution to milk yield come from the contribution of the two parameters.

APPENDIX2.

DATA COLLECTED

COW NUMBER	PARITY	DAYS IN LACTATION	DRY DAYS	MILK YIELD IN Kg	CALVING INTERVAL	SEASON OF CALVING
506	1	193	132	1790.2	452	2
	2	455	206	2679.3	325	1
	3	493	76	3842.1	661	1
	4	532	120	3420.2	569	2
	5	538	95	2477.9	652	2
				14210		
328	1	310	83	3383.8	408	1
	2	366	98	4839.5	393	1
	3	534	98	4977.8	464	2
	4	287	55	3511.8	632	1
				16713		
8614	1	347	27	3885.3	317	1
	2	398	88	3485.6	374	1
	3	312	51	3898.2	486	2
	4	339	51	2866.8	363	2
	5	365	46	3468.2	390	2
				17604		
8606	1	561	75	4273.3	442	2
	2	311	27	3504.7	636	1
	3	341	56	3020.9	338	2
	4	382	74	1918	397	1
				12717		
501	1	466	49	4487.2	387	1
	2	332	44	3706.2	515	2
	3	286	53	2335.8	376	2
	4	325	42	2124.5	339	2
	5	380	60	2365.7	367	2
				15019		
314TF	1	352	52	3448.2	500	1
	2	454	40	4460.1	404	1
	3	333	97	3207.7	494	2
	4	487	68	3559.4	430	2
				14675		

233	1	478	194	4701.6	498	2
	2	317	86	2008	672	2
				6709.6		
238	1	368	147	3142.5	496	1
	2	287	79	2043.5	515	2
	3	243	107	1194.2	366	2
				6380.2		
319	1	316	45	3783.9	364	1
	2	365	57	3868.6	361	1
	3	461	146	4377.7	422	2
				12030		
334	1	571	64	6840.2	362	1
	2	306	23	3489.7	635	1
	3	410	124	3028.1	329	2
	4	256	43	2653.2	534	1
				16011		
516	1	437	89	3093.4	549	1
523	1	337	89	3718.4	428	1
	2	256	88	3835.5	426	1
	3	410	136	3620	376	1
	4	255	94	2192.4	546	2
				13366		
8631TF	1	450	46	3473	434	1
	2	289	56	3138.4	496	2
	3	418	71	2743.5	345	2
	4	599	68	3545.1	489	2
				12900		
9015	1	414	71	3659.2	469	2
	2	307	21	3756.6	485	1
				7415.8		
8718	1	708	54	5198.8	502	2
8725	1	285	49	2514.9	434	1
	2	7	48	26.2	336	1
	3	284	47	2663	484	1
	4	240	467	2095.1	331	1
				7299.2		

8902	1	306	50	2982.3	472	2
	2	288	127	2072.7	356	2
	3	412	46	3488.1	415	2
	4	416	53	3910.2	458	2
	5	352	127	3455.5	469	1
				15909		
8906	1	329	58	2380.5	724	1
8	1	281	50	3217.2	445	1
2	1	243	191	2673.9	514	1
	2	391	89	4125	434	1
				6798.9		
137	1	363	32	3538.1	439	2
	2	342	63	2953.9	395	1
	3	278	94	2830.1	405	1
				9322.1		
215	1	364	56	3488.1	350	1
	2	366	104	4103.3	420	1
	3	339	13	3195.4	470	2
				10787		
9013B	1	353	181	2579.7	487	2
202TF	1	333	46	2489.6	417	2
	2	317	70	3338.1	369	2
	3	455	110	760.5	376	2
	4	384	94	3588	564	1
				10176		
208	1	516	57	5675.8	835	1
302	1	410	125	3186.2	441	2
	2	366	58	4073.3	535	1
	3	307	103	2580.7	424	1
				9840.2		
308	1	434	80	3733	492	1

309	1	539	71	3626.4	408	1
	2	290	62	3088.4	610	1
				6714.8		
323	1	319	147	2951.7	517	1
324	1	299	63	4018.6	444	2
	2	559	112	5638.5	362	2
				9657.1		
416	1	394	51	4411	385	1
	2	373	117	4506.7	445	1
	3	339	102	3983.9	490	2
				12902		
503TF	1	323	67	2619.5	577	1
503	1	515	143	4391.3	433	1
	2	338	85	3843.9	658	1
	3	461	163	3435.1	423	1
				11670		
518TF	1	342	279	2796.4	392	1
521	1	466	299	3298.2	424	2
	2	308	122	1932.1	765	2
				5230.3		
526	1	350	77	2018.7	488	1
500	1	425	129	3255.4	636	1
609	1	287	44	1997.1	410	2
F731TF	1	398	126	4237.6	421	1
	2	326	291	2903.7	524	2
	3	252	91	2548.7	617	1
	4	259	120	1660.2	343	1
				11350		
923	1	495	86	3751.2	538	1

8710	1	382	40	4939.4	600		1
	2	376	96	4203.1	422		2
	3	313	49	3574.4	472		2
	4	356	124	3354.2	362		2
				16071			
8905	1	366	98	2447.2	340		1
313TF	1	333	71	2372.2	510		2
	2	479	121	3036.6	404		2
	3	367	108	2784.9	600		1
				8193.7			
303	1	428	335	3766	655		1
	2	417	194	3280.1	763		1
				7046.1			
307TF	1	428	29	3335.7	459		1
	2	447	26	4464.2	457		1
	3	468	244	3749.2	473		2
				11549			
TS14TF	1	467	227	726.4	650		1
	2	389	127	2290.3	694		2
	3	250	123	2213.4	516		2
	4	229	111	1911.7	373		2
				7141.8			
304	1	469	40	2988.7	503		1
	2	314	51	3476.6	509		2
	3	465	61	3444.8	365		2
	4	430	26	2641.6	1078		2
				12552			
114	1	280	55	2523.3	429		2
203TF	1	256	53	2585.5	373		1
	2	379	49	3611.8	409		2
	3	292	19	2659.7	428		2
	4	458	70	2647.6	311		2
				11505			
211TF	1	405	82	3827.9	629		2
	2	408	115	1968.3	437		1

	3	360	178	2862	523	1
				8658.2		
9004	1	481	78	4134.4	506	2
9016	1	284	101	1454.6	896	1
9005	1	266	114	2795.7	390	1
9006	1	591	89	2401.8	540	2
9008	1	369	75	2702.8	493	2
9013S	1	362	65	2198.4	484	2
TS05TF	1	364	161	2046.2	344	2