



Identification of Moisture Loss and Weight Drop of Soap Tablets in Different Conditions

Ranasinghe DK¹
Dissanayake KDDN²

ABSTRACT

Soap which consists of fats, colours, perfumes, fillers, water etc. can be categorized into laundry, bathing and baby soap. The moisture level and weight of the soap tablets are formulated and manufactured according to the soap category. In general, shelf life of these soap tablets is expected to be around 24 months. During this period, moisture and weight of the soap are more vulnerable to drop based on the storage conditions. Therefore, it is important to identify the behaviour of moisture evaporation and weight drop under different conditions. Thus this research was carried out to identify those fluctuations in order to understand the qualities of soaps at use. The research was conducted on randomly selected 96 soap tablets from each of seven different soaps selected from three main soap categories of laundry, bathing and baby soap in order to test the moisture and weight loss with time in different conditions. Descriptive analysis were carried out using SPSS and according to the findings, weight drop of all soap tablets were revealed in all four conditions at different rates during three months period of time. The rate at which the weight and moisture level drop was depending on the temperature in the storage condition. Bathing soap recorded maximum lose of moisture up to 47% and 8.5% of weight and laundry soaps lose maximum weight up to 12.5% and 30% of moisture with compared qualities at production and in other words qualities promised to customers. Thus appropriate strategies to maintain storage conditions and use more effective packaging materials should be identified through extensive research for all different kinds of soap tablets in order to ensure delivering customers the quality standards of soaps as expected or promised by the manufacturers.

KEYWORDS: Moisture Loss, Shelf Life, Soap, Weight Drop

INTRODUCTION

Cleaning products play an essential role in our daily lives. By safely and effectively removing soils, germs and other contaminants, they help us to stay healthy, care for our homes and possessions, and make our surroundings more pleasant.

The public understanding of the safety and benefits of cleaning products is critical to their proper use. Therefore, it is very much important not only to produce the high quality soaps but also to maintain that

quality until it is been consumed.

Moisture in the soap is a very important factor which keeps the soap without making it dry. But with the time, moisture level in the soap gets evaporated automatically due to various environmental conditions such as contact or stored in a warm condition. And it makes the soap dry and rough which decrease the quality level of the soap. The control of moisture evaporation is the main challenge to ensure quality and it happens due to external environmental factors. Therefore, it is important to understand the rate of moisture loss and weight drop at different environmental conditions in order to emphasize importance of suitable condition for storage of soap tablets and further investigations of qualities of packaging materials.

¹Graduate, Department of Industrial Management, Faculty of Applied Sciences, Wayamba University of Sri Lanka

²Senior Lecturer, Department of Industrial Management, Faculty of Applied Sciences, Wayamba University of Sri Lanka

LITERATURE REVIEW

Packaging for High Moisture Bar Soap

Packaging is provided for high moisture bar soap compositions to address a number of potential problems associated with high moisture bar soap compositions, providing solutions such as:

- Minimizing moisture loss
- Inhibiting mould growth on paper board material used in the packaging
- Preventing the development of collared stains on the bar soap and packaging

which result from chemical reaction between the high moisture bar soap and the paperboard, especially in recycled paper board. The bar soap packaging comprises a laminate material comprising a paperboard material, a thermoplastic material disposed on at least one side of the paperboard material, and a fungicide (Zhang et al, 2007).

However, upon storage in conventional paperboard packaging, high moisture bar soaps tend to encounter number of potential problems. These problems include moisture loss (via evaporation or absorption into the paperboard packaging material), mould growth on the paperboard packaging material etc.

Water

The bar soap composition of the present invention comprises at least about 15%, more preferably at least about 20%, and more preferably at least about 25%, by weight of the composition, of water. The level of water can be still higher, e.g. 30%, 35%, or even 40%, but is typically not greater than about 60%, preferably not greater than about 55%, and more preferably not greater than about 50%, by weight of the bar composition.

It should be understood that an amount of water will be lost, i.e. evaporated, during the process of making the bar composition. Also, once the finished product is made, water can further be lost from the bar composition due to water evaporation,

water being absorbed by surrounding packaging (e.g. a cardboard carton), and the like. Packaging the bar soap composition in a package of the present invention will reduce the amount of water lost due to evaporation upon storage or absorption into the package (Zhang et al, 2007).

RESEARCH METHODOLOGY

The main focus of the research was to understand the moisture loss and weight drop in soap tablets due to evaporation with the time when soap tablets are stored in different conditions. In order to understand the behaviour of this moisture loss and the weight drop, the research was designed and developed accordingly.

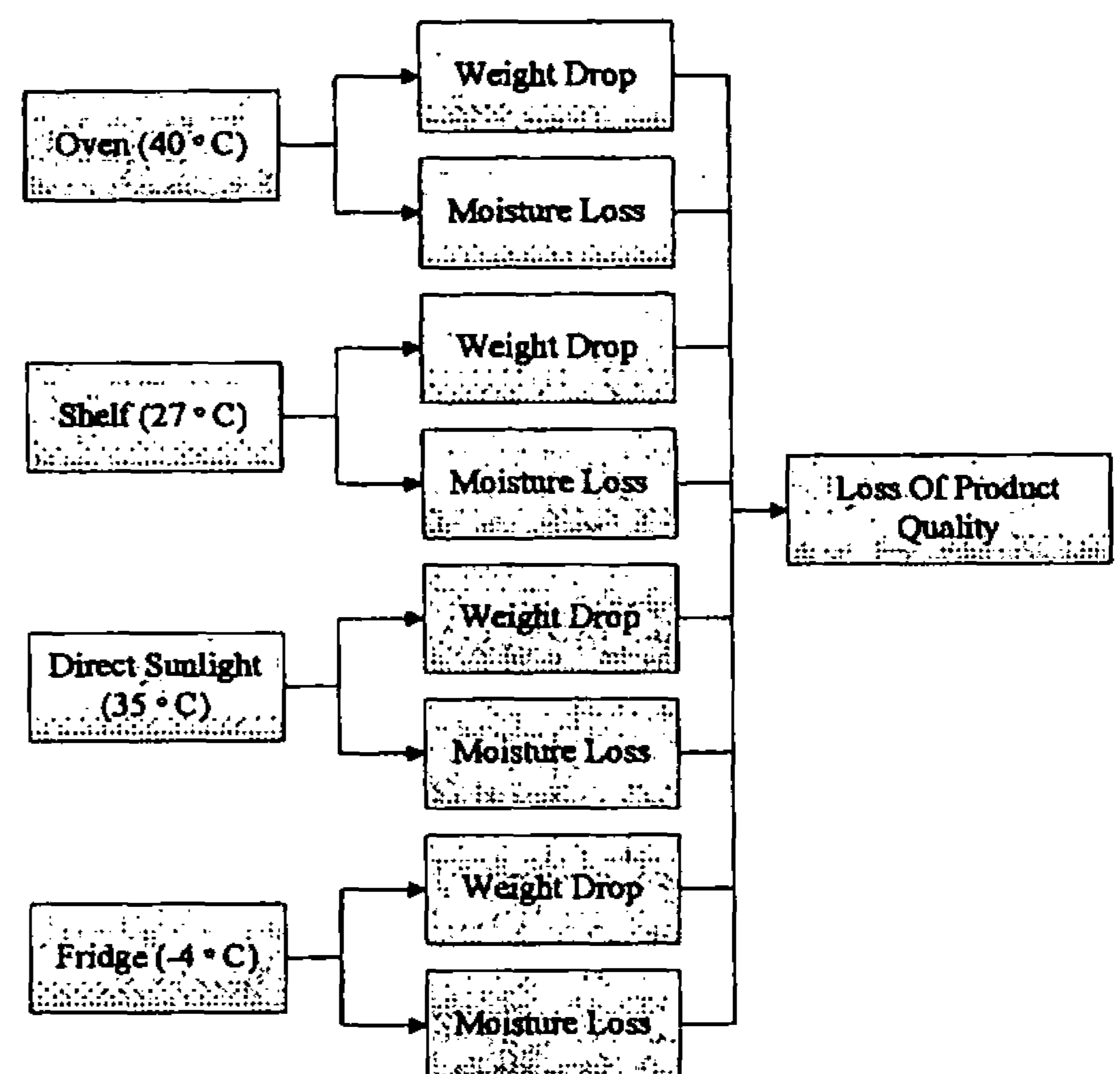


Figure 1: Research Model

The initial weight of each of seven different types of soaps tablets from three main categories of this product were measured before they were stored. Out of all 672 soap tablets, ninety six tablets from each of seven types of soaps were randomly selected to store in each of four different conditions such as fridge (-4°C), oven (40°C), shelf (27°C) and direct sunlight (35°C). These conditions were selected in order to cover different whether conditions prevailing all around the country during a calendar year. Two soap tablets from each of seven types were taken out from each storage conditions at the end of each week

for testing and then removed from storage. The moisture level and the weight of the soap were measured using laboratory equipment for a period of three months.

All the data related to the research were collected using laboratory testing. Data were analyzed using descriptive analysis using SPSS.

DATA ANALYSIS & RESULTS

The research was conducted by randomly selecting 96 soap tablets from each main soap category. The following soap categories were selected for the research.

Soap Categories

- Laundry Soap Type A
- Laundry Soap Type B
- Bathing Soap Type A
- Bathing Soap Type B
- Bathing Soap Type C
- Baby Soap Type A
- Baby Soap Type B

The following section presents the findings of weight and moisture level changes of each of the seven soap tablets at different storing conditions and at the end of the section overall summery is reported.

Weight Drop and Moisture Loss in Laundry Soap Category during Three Months Time Period

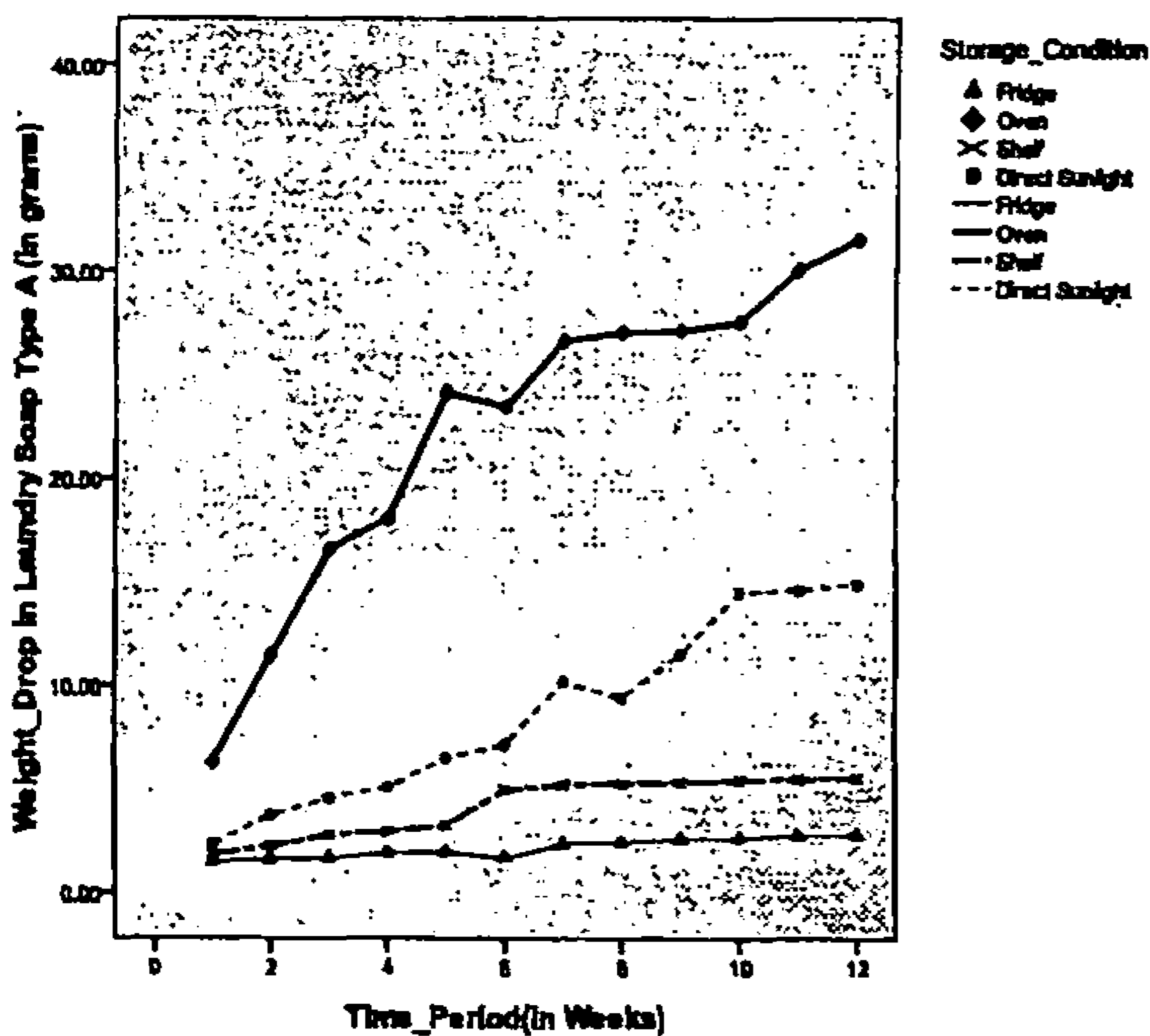


Figure 2: Weight Drop in Laundry Soap Type A

Figure 2 indicates that there is a continuous weight drop in Laundry Soap Type A over the time in all four conditions.

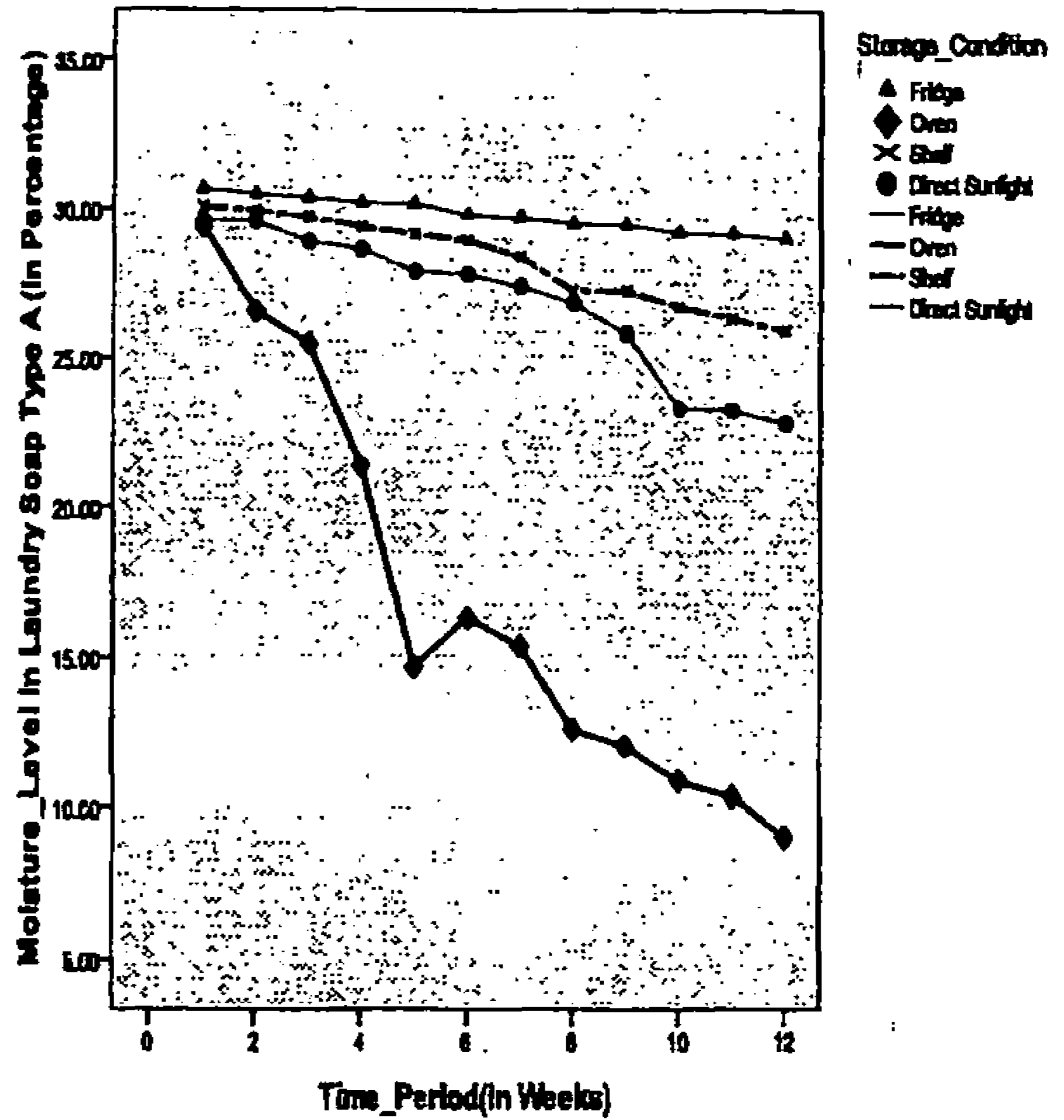


Figure 3: Moisture Level in Laundry Soap Type A

The Figure 3 was drawn for the moisture level in the Laundry Soap Type A during a three months period. Moisture level decrement was indicated in all four storing conditions.

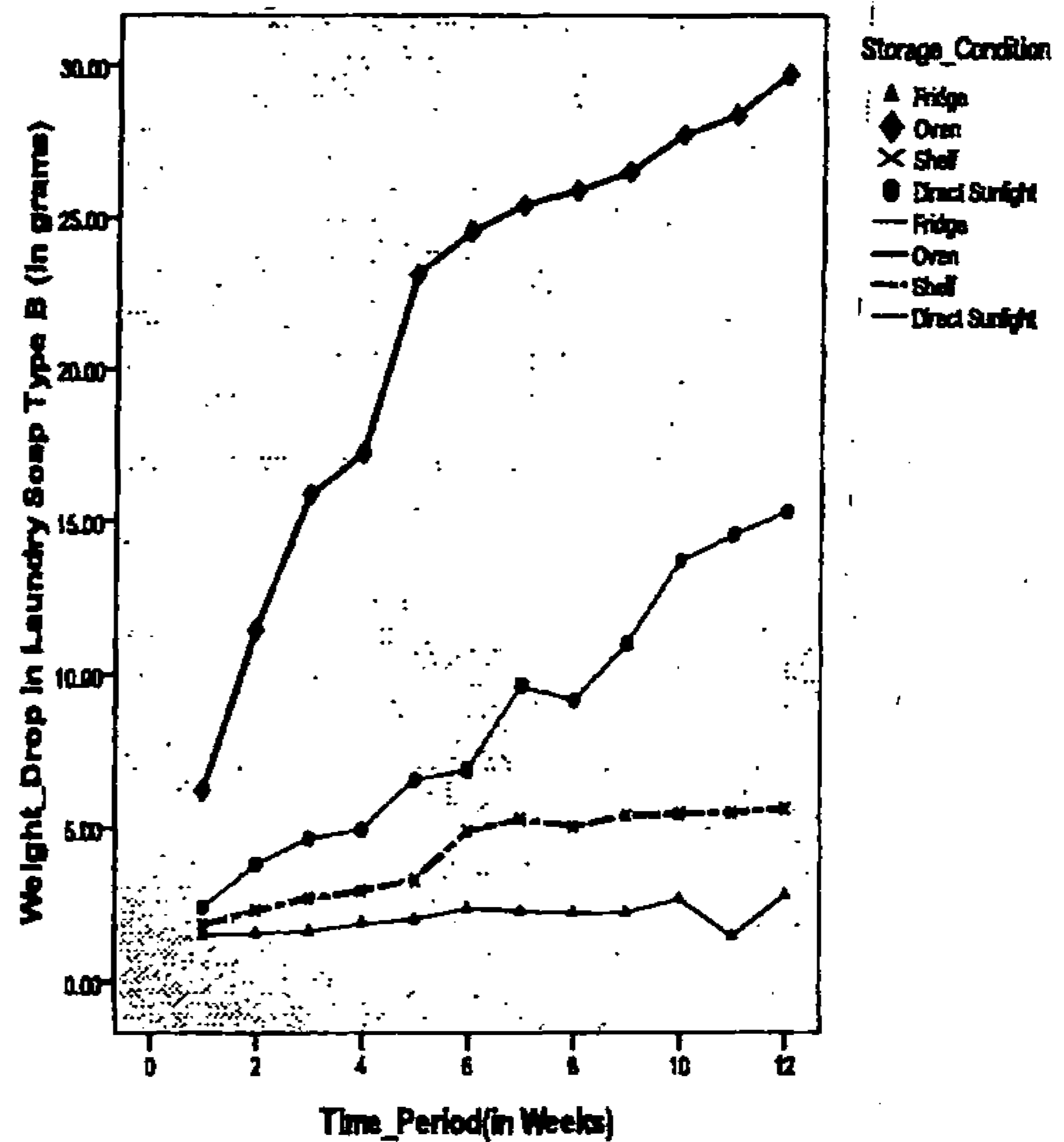


Figure 4: Weight Drop in Laundry Soap Type B

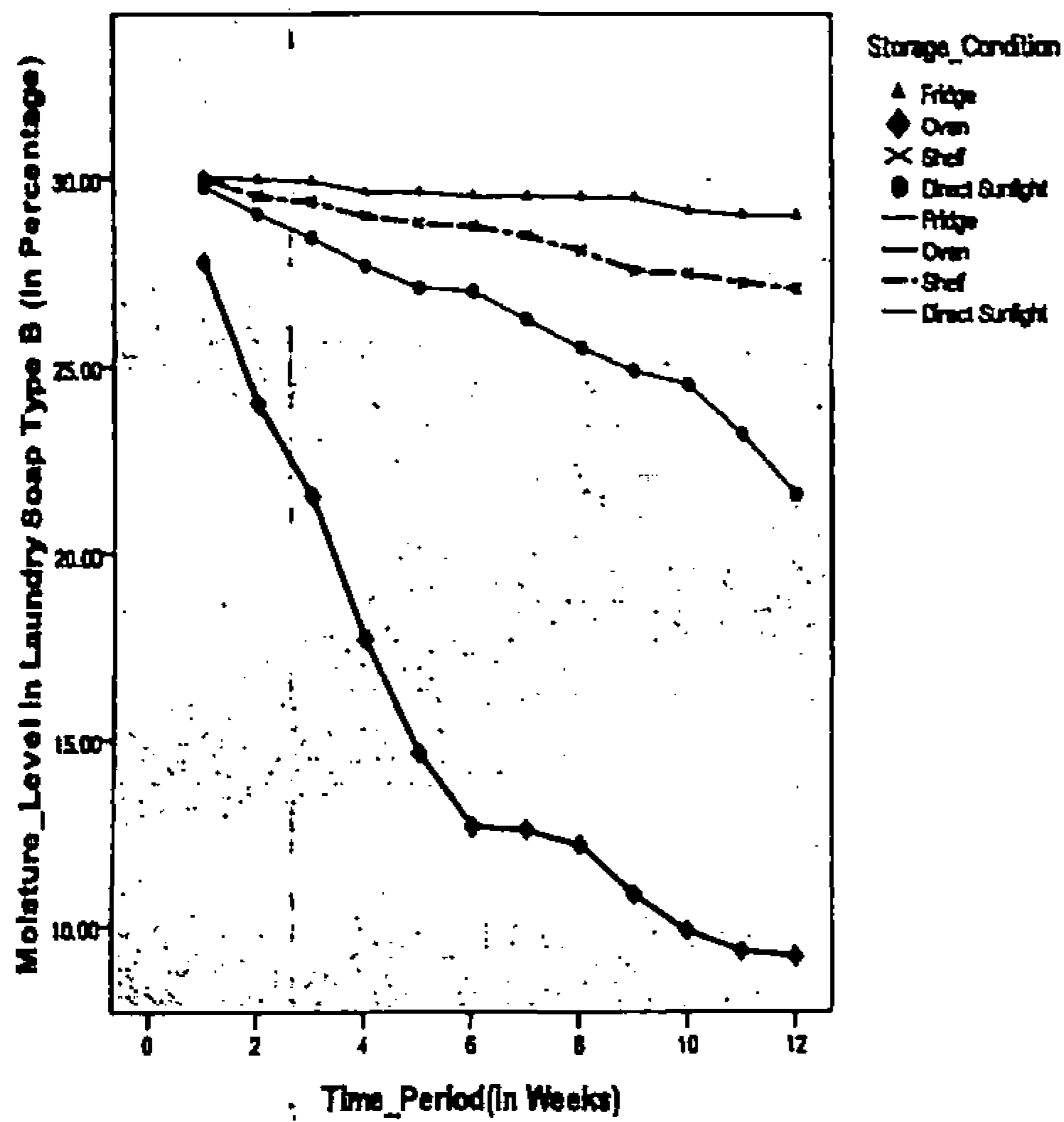


Figure 5: Moisture Level in Laundry Soap Type B

Similar results were received for Laundry Soap Type B as Laundry Soap Type A. As per Figure 4 and 5, continues weight drop and a moisture level drop were recorded for Laundry Soap Type B over the time in all four conditions.

Weight Drop and Moisture Loss in Bathing Soap Category during Three Months Time Period

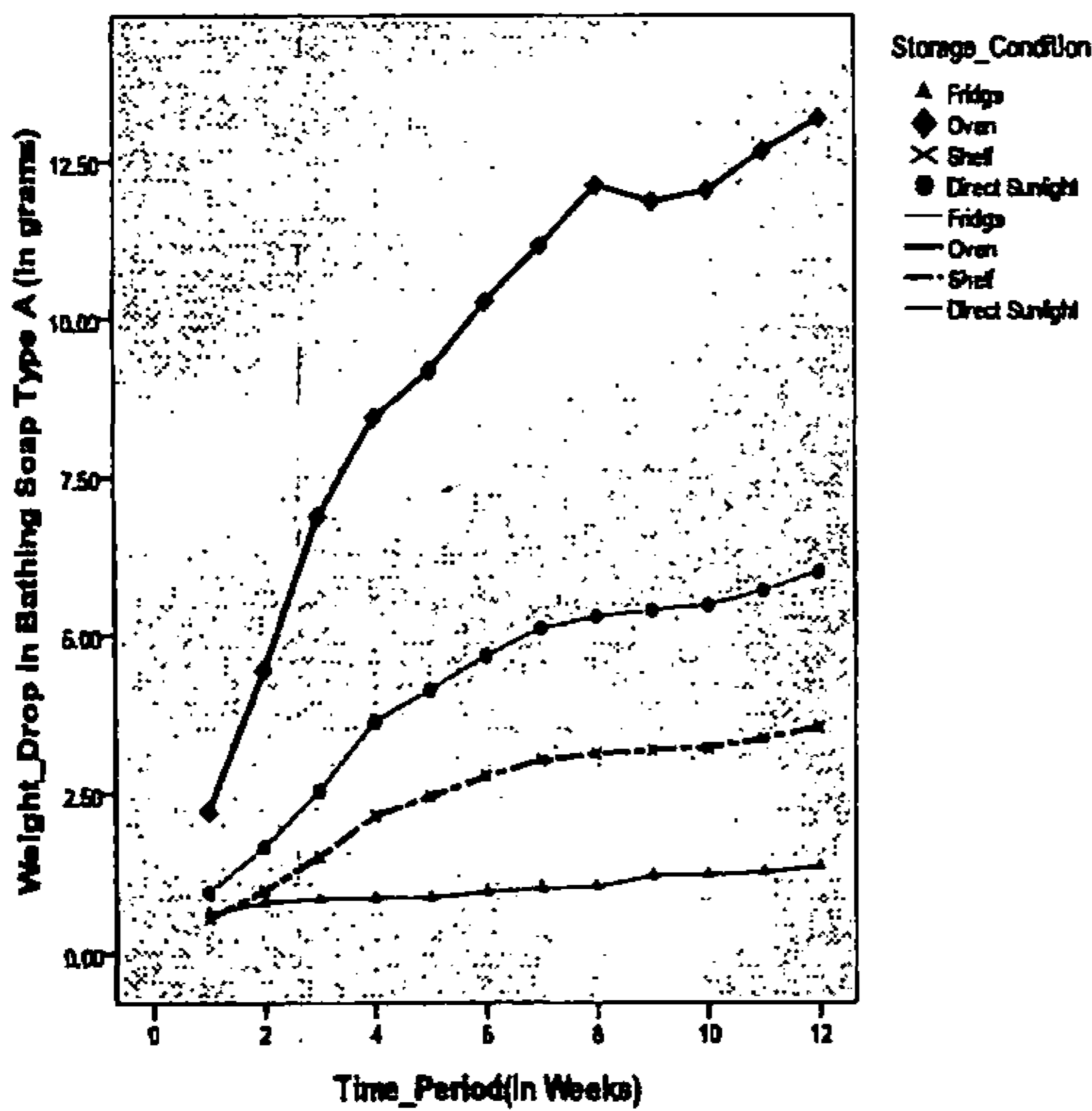


Figure 6: Weight Drop in Bathing Soap Type A

Figure 6 indicates that there is a gradual weight drop in Bathing Soap Type A over the time in all four conditions.

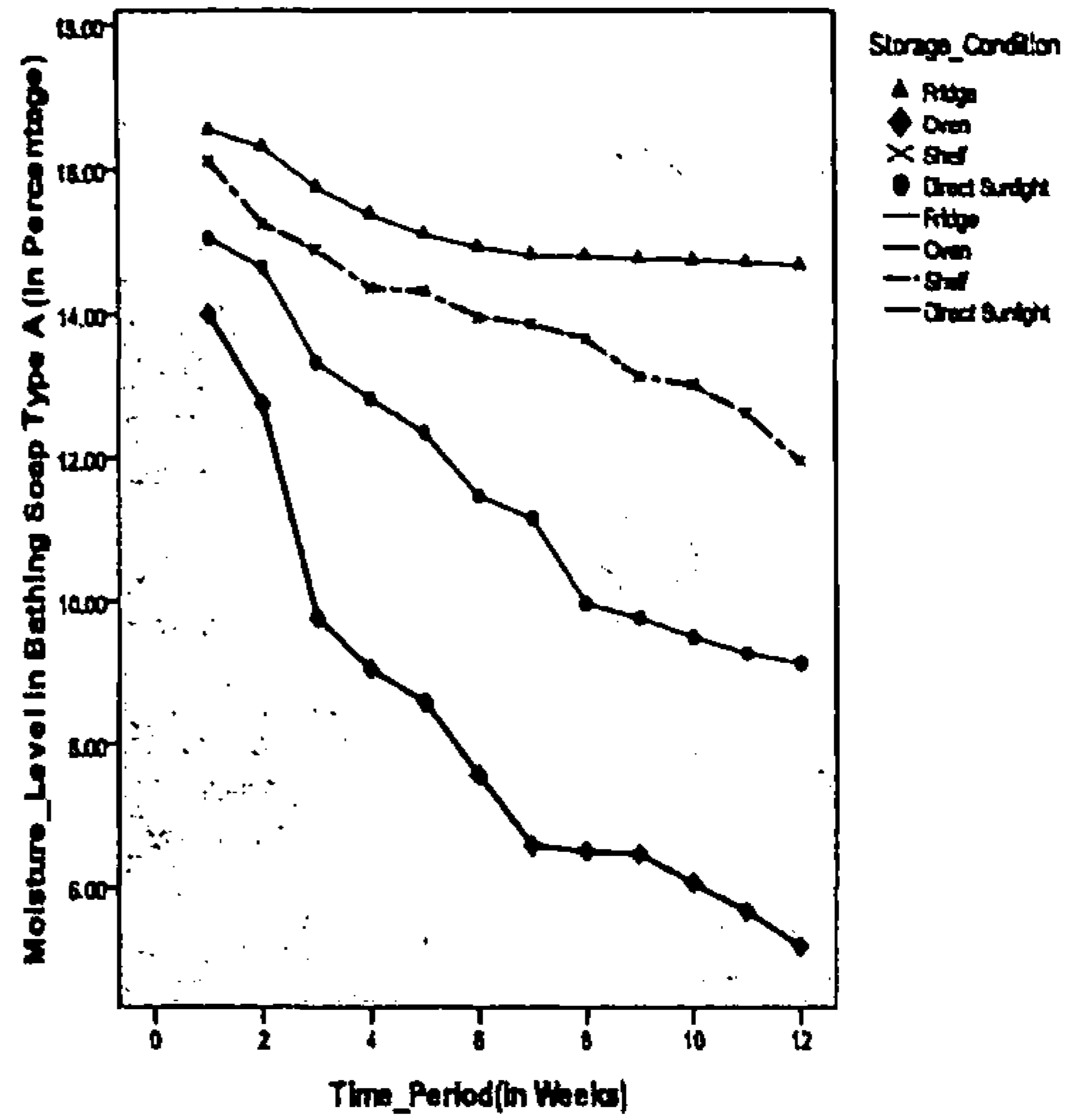


Figure 7: Moisture Level in Bathing Soap Type A

There was a continuous moisture level reduction recorded for Bathing Soap Type A which is indicated in the above Figure 7.

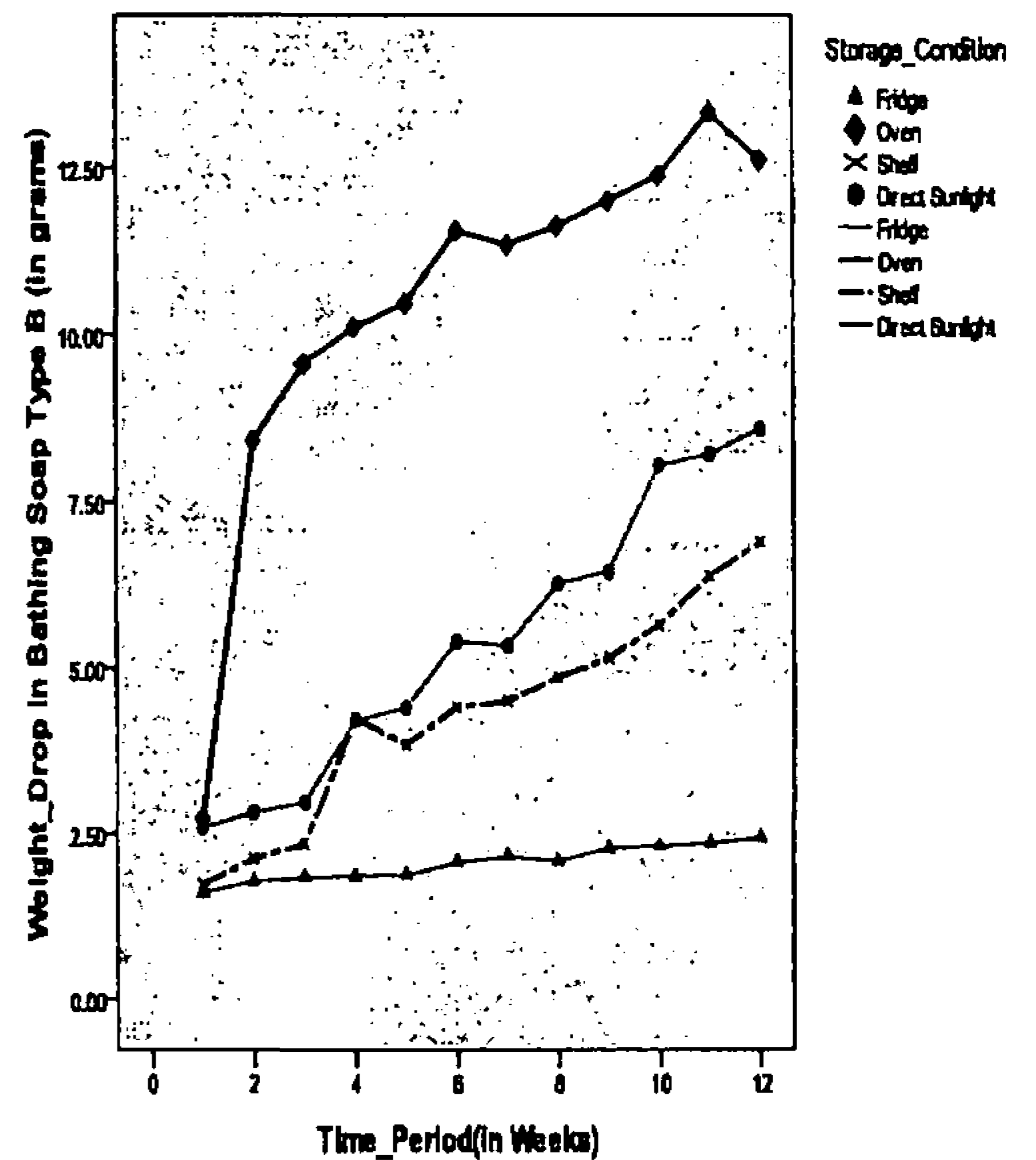


Figure 8: Weight Drop in Bathing Soap Type B

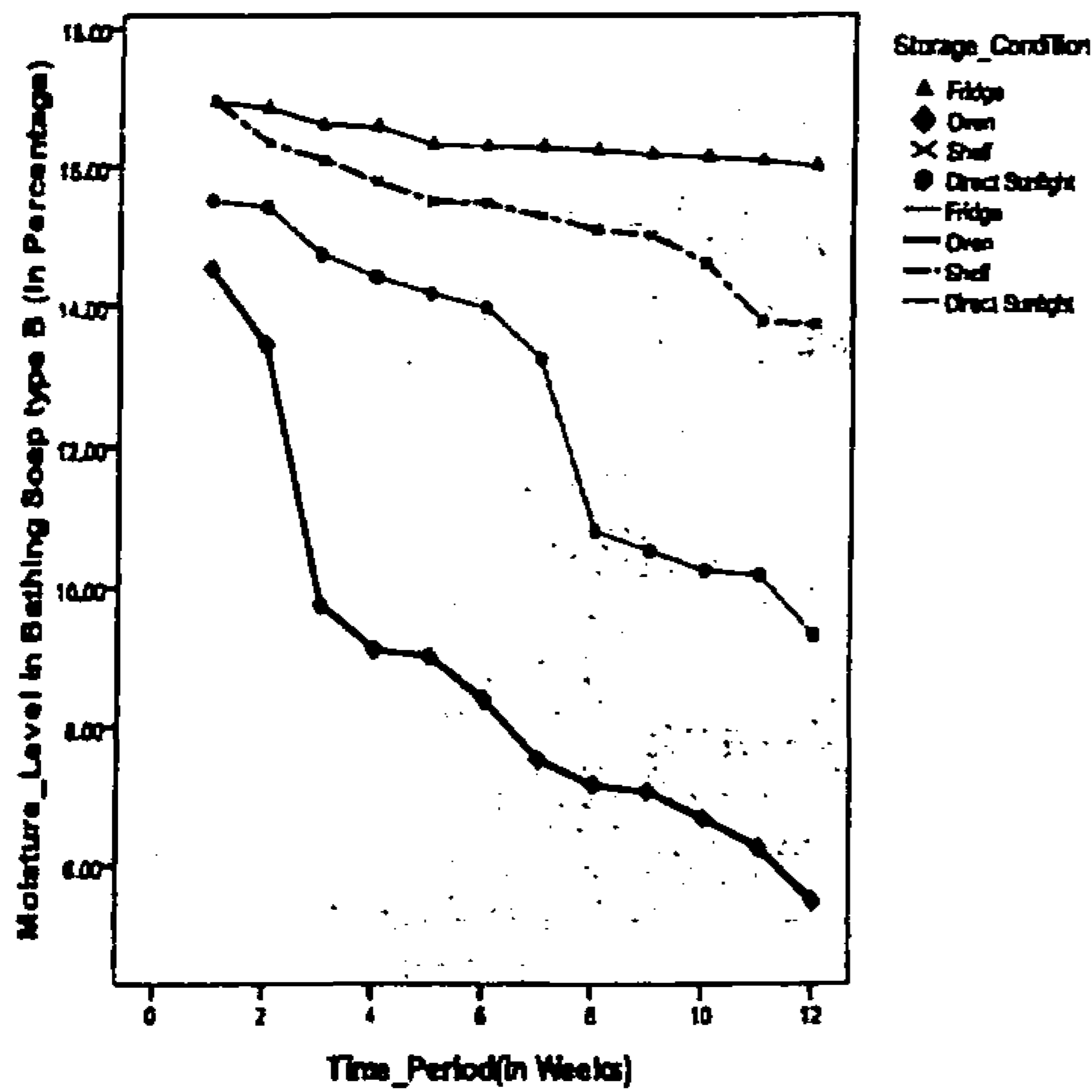


Figure 9: Moisture Level in Bathing Soap Type B

According to Figures 8 and 9, a clear weight drop and moisture level reduction over the time can be identified in all four conditions for Bathing Soap Type B.

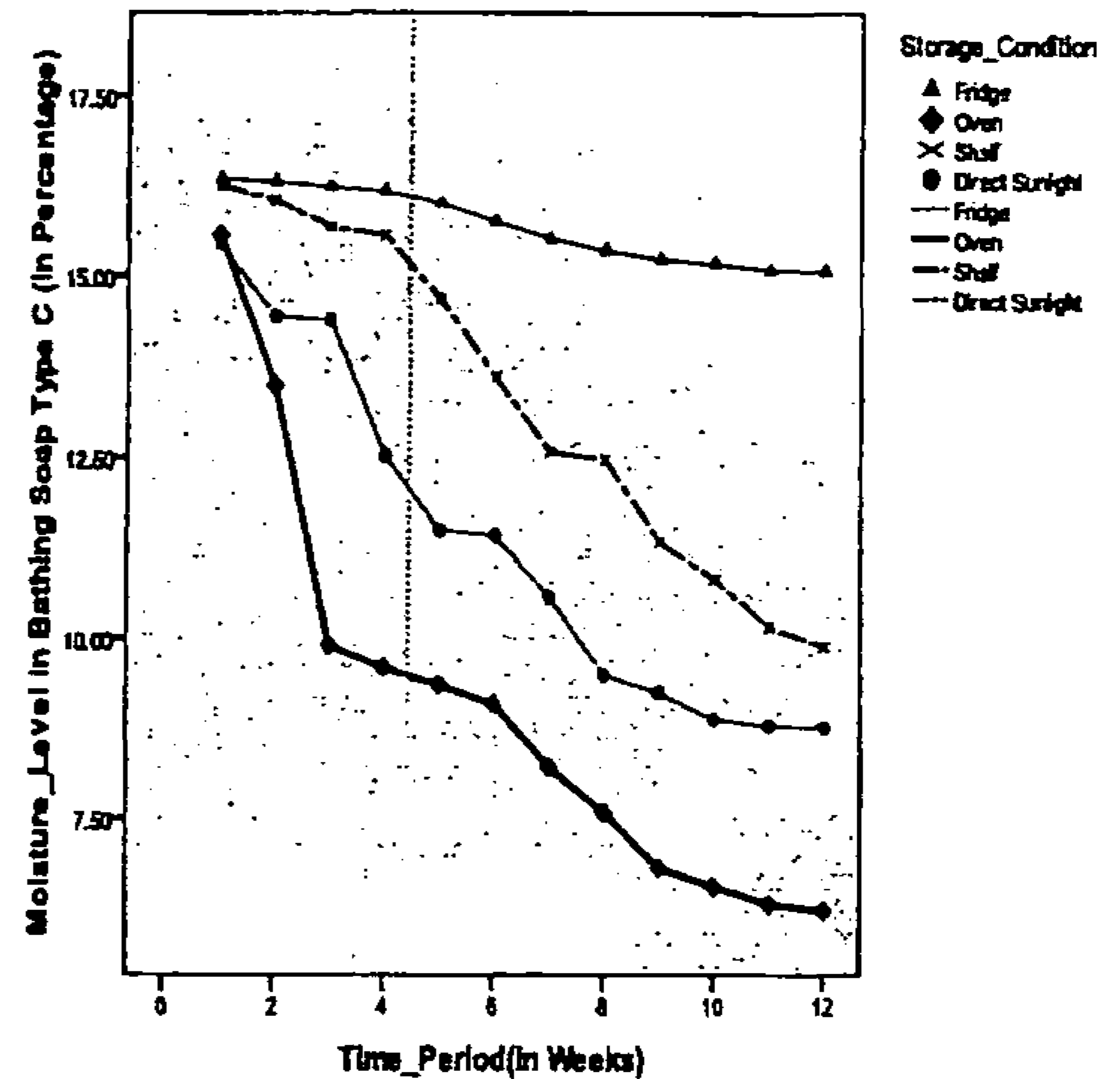


Figure 11: Moisture Level in Bathing Soap Type C

As per the Figures 10 and 11, similar results were received for Bathing Soap Type C as other two types of bathing soap. A gradual weight drop and moisture level decrement was indicated in all four conditions with the time.

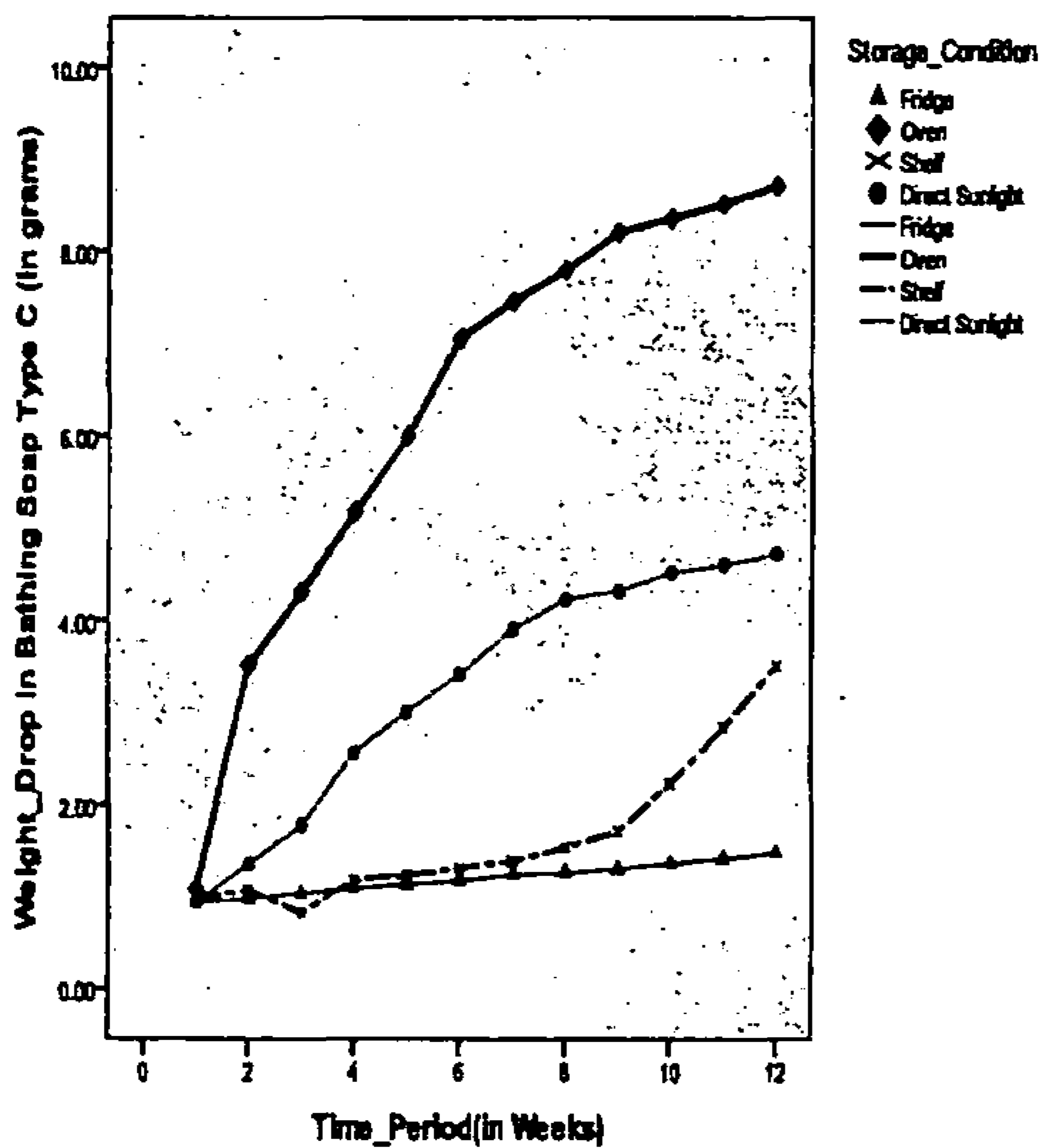


Figure 10: Weight Drop in Bathing Soap Type C

Weight Drop and Moisture Loss in Baby Soap Category during Three Months Time Period

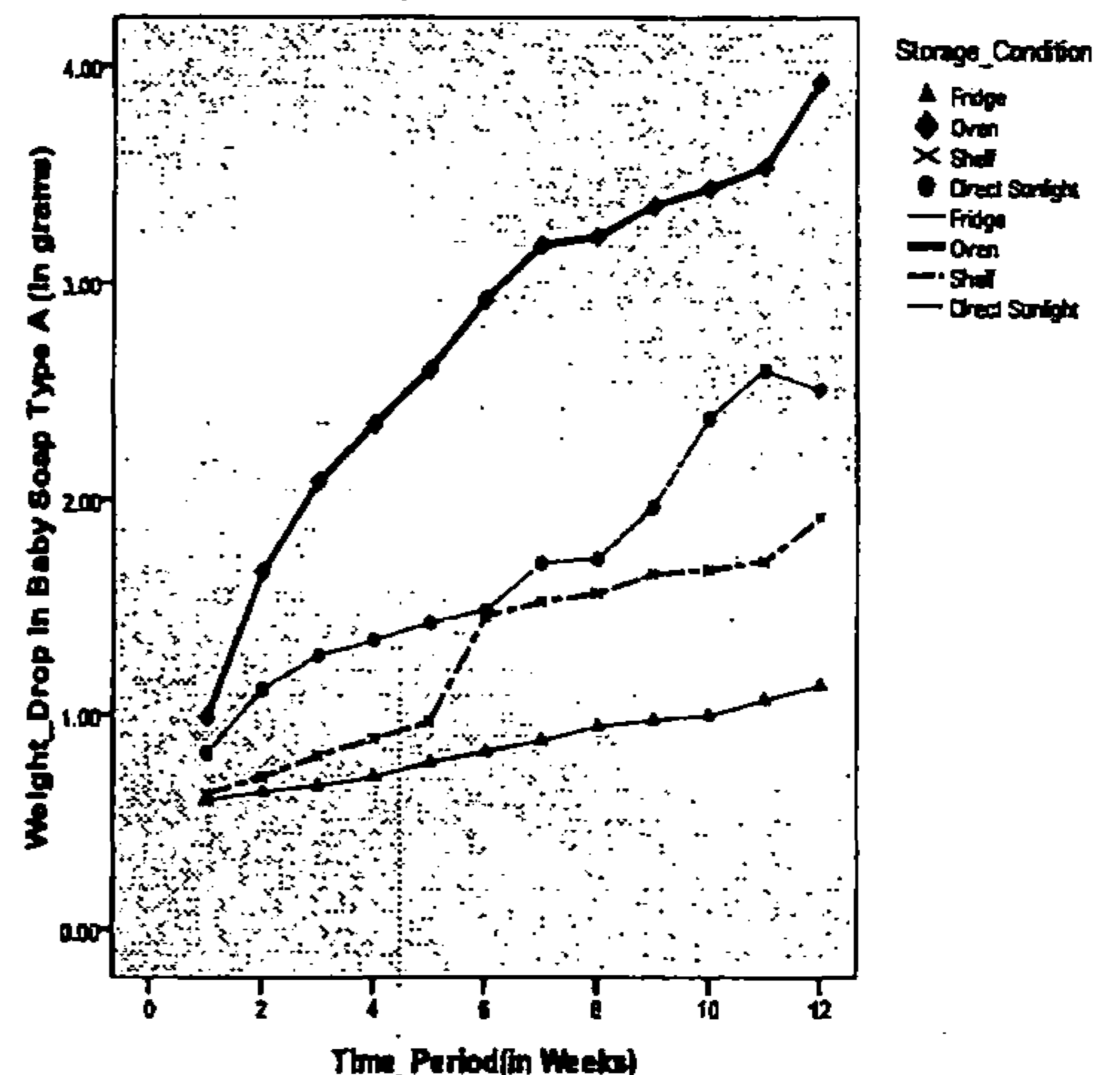


Figure 12: Weight Drop in Baby Soap Type A

Figure 12 indicates that there is a clear weight drop in Baby Soap Type A during three months time period.

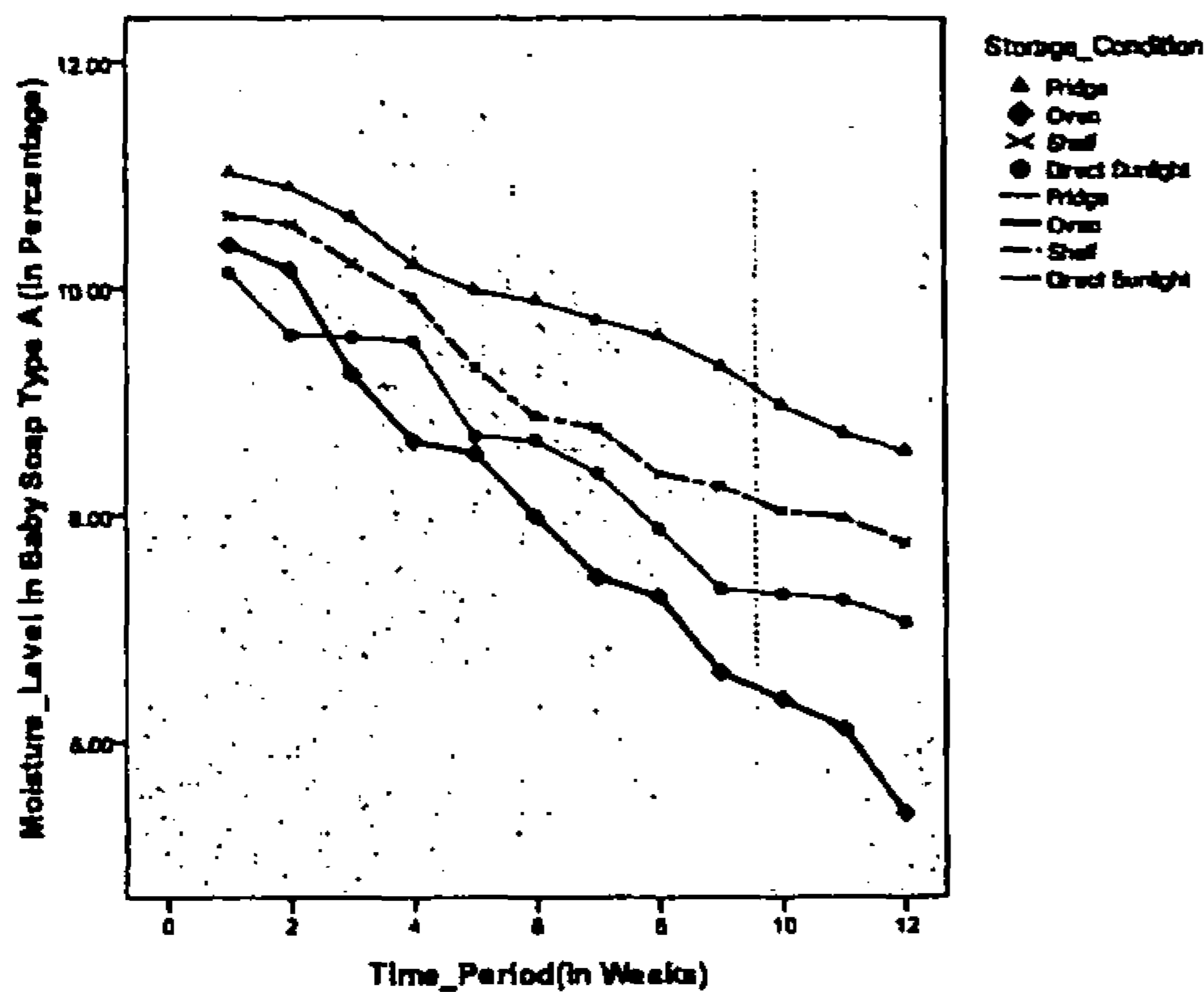


Figure 13: Moisture Level in Baby Soap Type A

According to Figure 13, there was a moisture level reduction in the Baby Soap Type A with the pass of time in all four conditions.

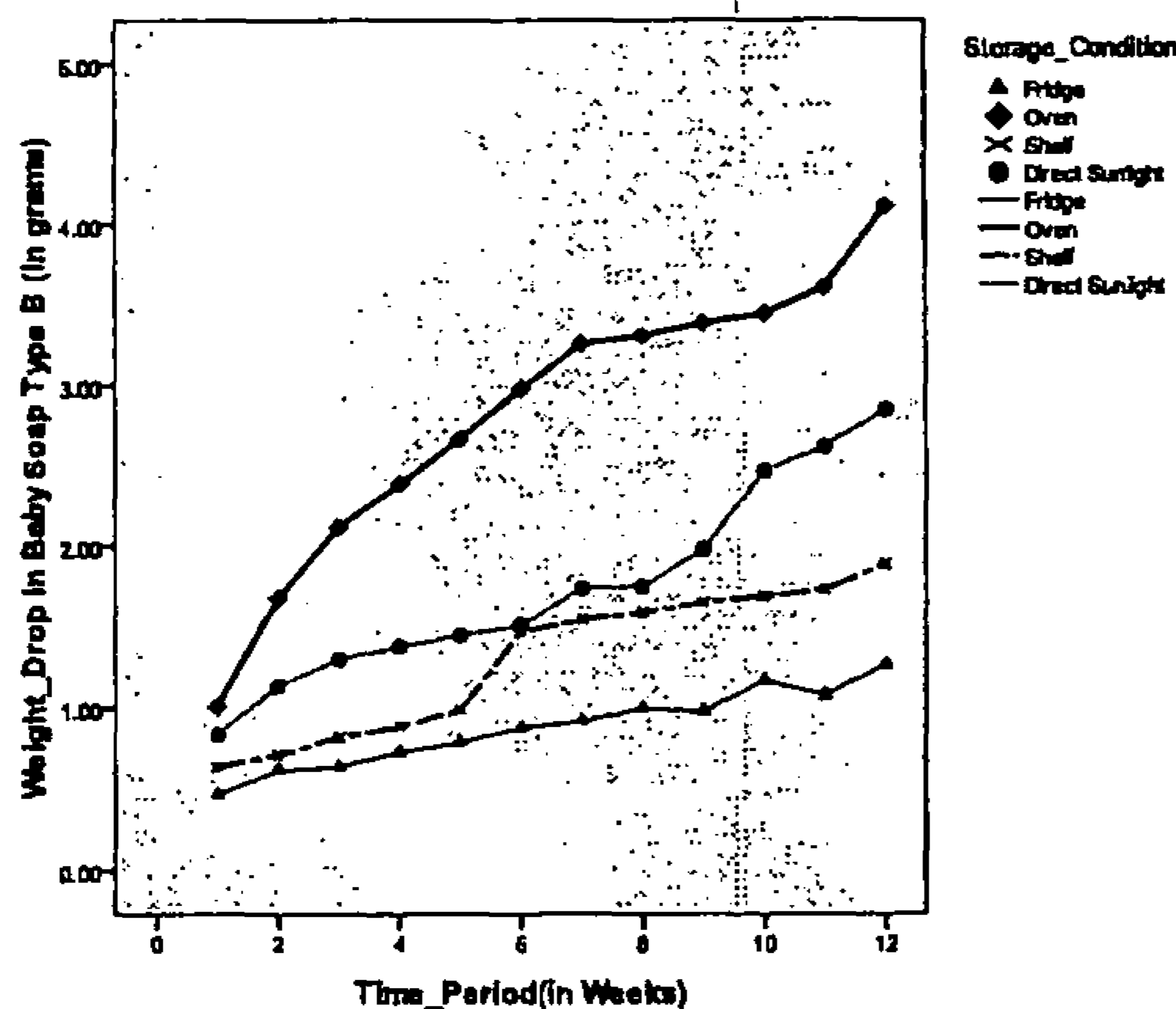


Figure 14: Weight Drop in Baby Soap Type B

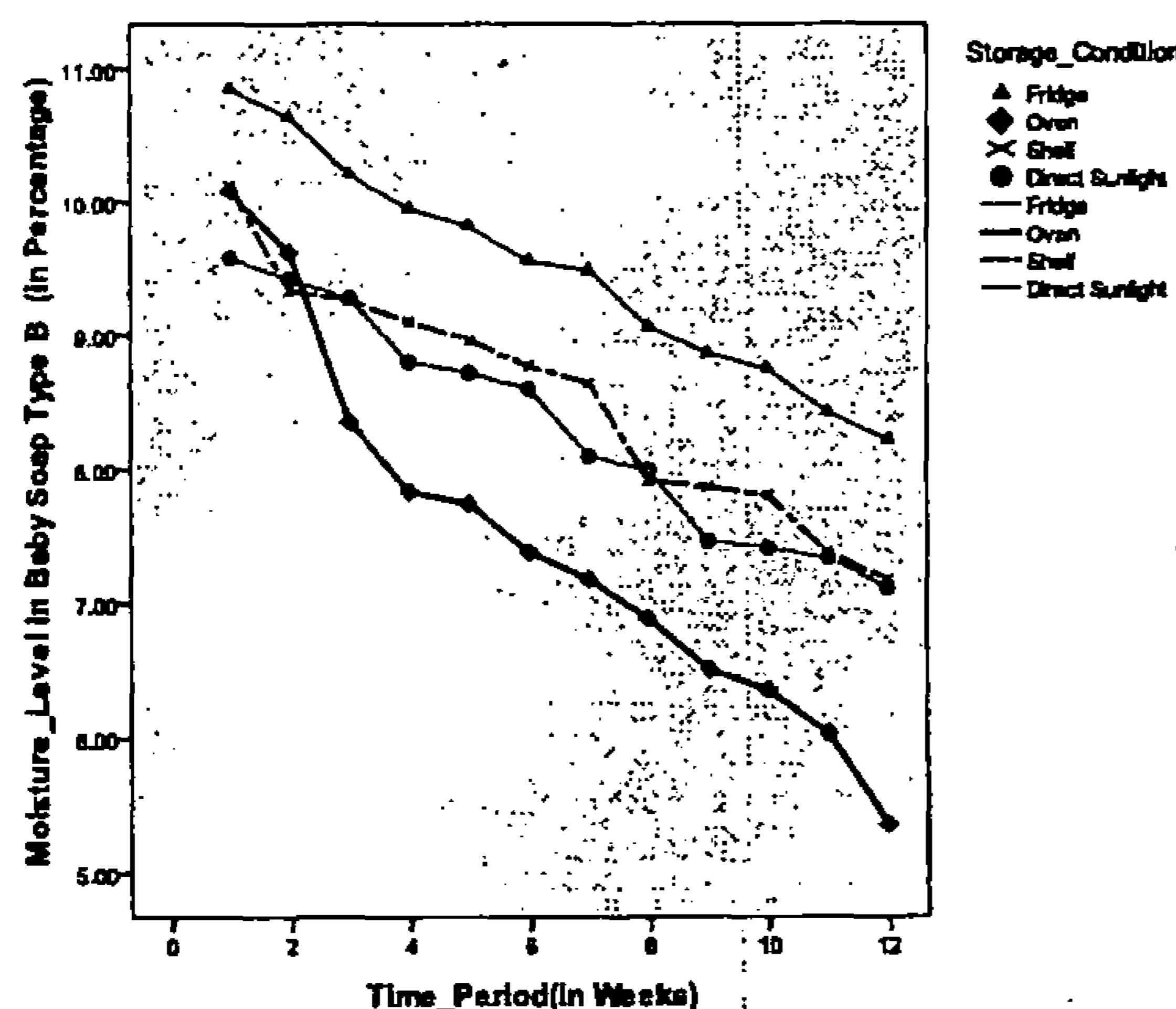


Figure 15: Moisture Level in Baby Soap Type B during Three Months Time Period

Figure 14 and Figure 15 show that there is a clear weight drop and gradual moisture level drop is recorded in all four conditions during the three months period of time.

Summary of weight Drop and Moisture Loss in all Types of Soaps at Different Conditions

The following section presents overall summary of weight and moisture level changes in seven types of soap from three different categories of product in four storing conditions after three months of time. It shows the percentages of moisture loss and weight drop compared to their initial values.

Table 01: Moisture and Weight Variation

	Moisture Loss % at the End of 3 Months			
	Fridge	Oven	Shelf	Direct Sun Light
Laundry Soap				
Laundry Soap Type A	6.36	70.96	16.30	26.33
Laundry Soap Type B	5.07	69.99	11.42	29.35
Bathing Soap				
Bathing Soap Type A	12.25	69.10	28.51	45.37
Bathing Soap Type B	5.88	67.72	19.28	45.27
Bathing Soap Type C	9.00	62.38	22.41	47.04
Baby Soap				
Baby Soap Type A	9.31	51.05	17.88	25.19
Baby Soap Type B	8.78	52.44	16.53	27.82

	Weight Loss % at the End of 3 Months			
	Fridge	Oven	Shelf	Direct Sun Light
Laundry Soap				
Laundry Soap Type A	2.25	24.97	4.56	11.73
Laundry Soap Type B	2.28	24.17	4.62	12.49
Bathing Soap				
Bathing Soap Type A	1.31	12.62	3.48	5.94
Bathing Soap Type B	2.36	12.10	6.58	8.42
Bathing Soap Type C	2.06	12.01	5.01	6.75
Baby Soap				
Baby Soap Type A	1.53	5.34	2.56	3.36
Baby Soap Type B	1.66	5.53	2.56	3.71

Soaps stored in oven gave the highest weight & moisture drop which indicated around 25% of initial weight and a 70% of moisture loss in laundry soap category. In bathing soap category, it

indicated about 12% initial weight and around 62% to 70% of moisture loss. The next highest drop indicated in direct sunlight condition which has around a 12% of initial weight and 26% to 30% of moisture loss in laundry soap category and 5% to 9% of initial weight and 45% to 47% of moisture loss were indicated in bathing soap category.

In shelf condition about 5% of the initial weight and 11% to 16% of initial moisture level were lost in laundry soap category and between 4% to 7% of the initial weight and 19% to 28% of initial moisture were lost at the end of three months.

DISCUSSION AND CONCLUSION

As per the results obtained from the analysis, there is a strong relationship between the moisture evaporation and the weight drop of soap tablet with the pass of time. This research was carried out by collecting data for a three months period at weekly intervals. At the end of three months, there was a huge drop in the weight of the soap tablets in all types of soaps in all three categories. The main reason for the

weight drop was identified as the moisture evaporation with the time. The actual reason for moisture evaporation was the storage temperature of the soap. Therefore, it is important to focus on the storage places of the soap especially when it goes to the market. On the other hand strategic selection of packaging material after an extensive research would be very useful to minimize the above losses.

Based on the findings, it can be concluded that storage and distributing conditions as well as packaging materials of soap tablets are needed to be retested and properly maintained in order to minimize the moisture evaporation and weight drop to ensure predetermined and promised standard of the product at the point of consumption.

REFERENCES

- Zhang, G., Liu J., & Salvador C.R. (2007). Packaging for high moisture bar soap, US patent 8,129,327 B2.p.3-5: <http://g.icodex.org/patents/US8129327>.