

Assessment of New Control Methods WG5:

Varromed Trial 2018

Coloss Varroa Control Task Force, WG5

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Introduction

The mite *Varroa destructor* is one of the main threats to the European honeybee *Apis mellifera* and thus for the beekeeping sector. The number of suitable products for the treatment is limited due to the need of low bee toxicity products, the risk of residues in bee products and the Varroa mite capability to develop resistance to the active principles. In this context, the availability of new treatments in the market can be a valuable help for beekeepers.

The objective of this newly formed Work Group (Varroa control TF Workshop, Unije, Croatia, 2016) is to test new Varroa control methods and products on different climatic conditions, finding the best way to apply them in order to increase the efficacy and reduce the toxicity and giving detailed and reliable information to beekeepers that would like to include them in their Varroa treatment protocols, as new tools against Varroa.

Given that in 2017 Varromed[®], an organic acids based product, was authorised for its distribution in the European Union, we would like to start the activities of this WG testing its performance in different conditions in the field. (see Annex 1: Summary of Product Characteristics –SPC- of Varromed).

We have designed several protocols taking into account the instructions given by the Varromed[®] producer and the seasons when to use it are indicated. The protocol for each treatment is accompanied by the respective protocol for the control group.

The protocol adopted is based on the EMA guidelines (EMEA/CVMP/EWP/459883/2008-CONSULTATION).

Group construction

-Use a minimum number of **10 colonies per group**. Use at least two groups for the trial (Varromed® treated group and control group).

-Consider the **strength** of the colonies and the **amount of varroa** present in the colony in order to build **homogeneous groups**.

-The colony strength evaluation is carried out twice, from one day to few hours before the Varromed® treatment application and at the end of the mite fall due to Varromed® treatment. We suggest to do it by using the Liebefeld method (Delaplane et al. 2013). In this way it will be possible to **evaluate the reduction of bee population** due to the toxicity of the treatment.

-Check the presence of the **queen** before and after the treatment.

Details of the protocols

The **winter protocol** is designed for **broodless colonies**, as recommended by the instructions of the product, so there is no queen-caging period to determine the residual amount of Varroa mites. To determine the residual amount of Varroa mites (follow-up treatment), use a double dosage of products containing **Amitraz or Fluvalinate** as active principles. In the winter protocols, the duration of the residual mite count will be 14 days due to the absence of brood, based on previous similar experiences (Pietropaoli et al., 2012).

The **autumn and spring protocols** have been designed considering the possible presence of male brood in the colony. To evaluate the residual amount of Varroa mites (follow-up treatment) use a double dosage of products containing **Amitraz or Fluvalinate** as active principles in combination with an **artificial broodless status** obtained by caging the queenbee in Var-Control cages (Figure 1) or other types of cages that do not allow the queen to lay eggs. These active principles (Amitraz or Fluvalinate) have been chosen because oxalic acid and formic acid are components of the evaluated

product, and temperature could not be suitable for the use of thymol-based products during the period of the trial.



Figure 1 – Var-Control cage

There are different protocols for autumn (x3 and x5 administrations) and spring (x1 and x3 administrations), as specified in the Varromed® instructions. **Administer the product more or less times depending on the number of fallen mites after the first days of the treatment**, as indicated in the graphics.

To administer the product, **in Dadant-Blatt hives trickle 5ml per space occupied by bees**, between the hive frames (following the indications of Varromed) (Table 1). In case you use beehives different from the Dadant-Blatt type, adapt the dose to the estimated number of bees present per frame.

Table 1. Dose of Varromed® per number of bees

N° of bees	5,000-7.000	7,000-12.000	12,000-30,000	>30,000
Varromed (ml)	15 ml	15 to 30 ml	30 to 45 ml	45 ml

Example:

In 1 Dadant-Blatt comb, fully occupied in both sides, there are 2,796 bees (Delaplane et al. 2013). For 5,000-7,000 bees it is indicated to use 15ml of Varromed®.

Therefore, having 2-3 occupied combs with bees (5,000-7,000 bees) we will have 2-3 spaces between the combs occupied by bees, so we will trickle 15ml of Varromed®.

Change the sticky sheets with 2-4 days intervals. Moreover, change the sticky sheets immediately before any new **treatment is administered to the colonies.**

Measurement of other parameters

Mean, maximum and minimum environmental **temperatures and humidity** should be daily recorded with Ibutton dataloggers (Maxim Integrated, San Jose, CA 95134 USA) (Figure 2), or similar devices, placed inside an empty hive, near the treated colonies.



Figure 2 – Ibutton datalogger

The information about the outside temperature and humidity can be taken from specialised webs that collect that kind of data.

It is strongly suggested to carry out the different actions in the apiary at the same time of the day (above all, the measurement of the colony strength).

References

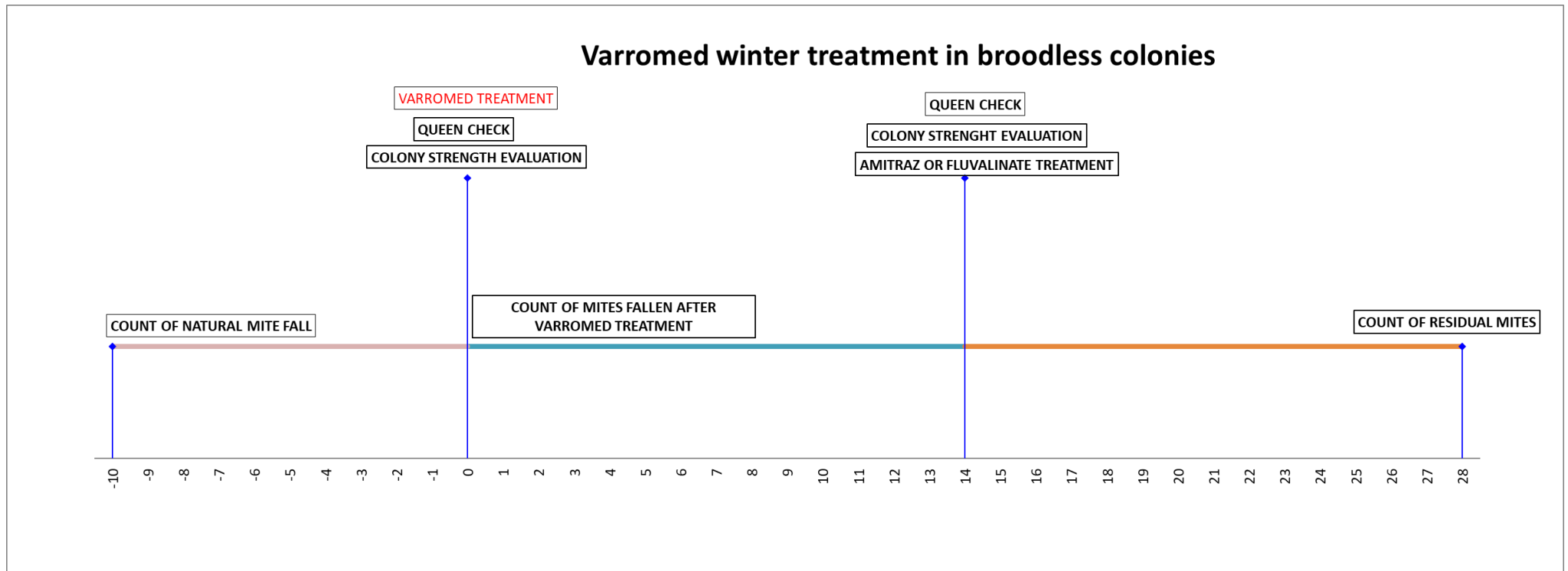
Delaplane, K. S., van der Steen, J., & Guzman-Novoa, E. (2013). Standard methods for estimating strength parameters of *Apis mellifera* colonies. *Journal of Apicultural Research*, 52(1), 1-12.

Pietropaoli M., Giacomelli A., Macrì S., Volterrani A., Pizzariello M., Formato G. (2012). Considerazioni sui risultati nel Centro Italia dell'impiego di acido formico in gel (MAQS™), nella lotta alla varroa, in condizioni di presenza di covata e di melario. *Apimondia Italia*: 1/2; 20-23).

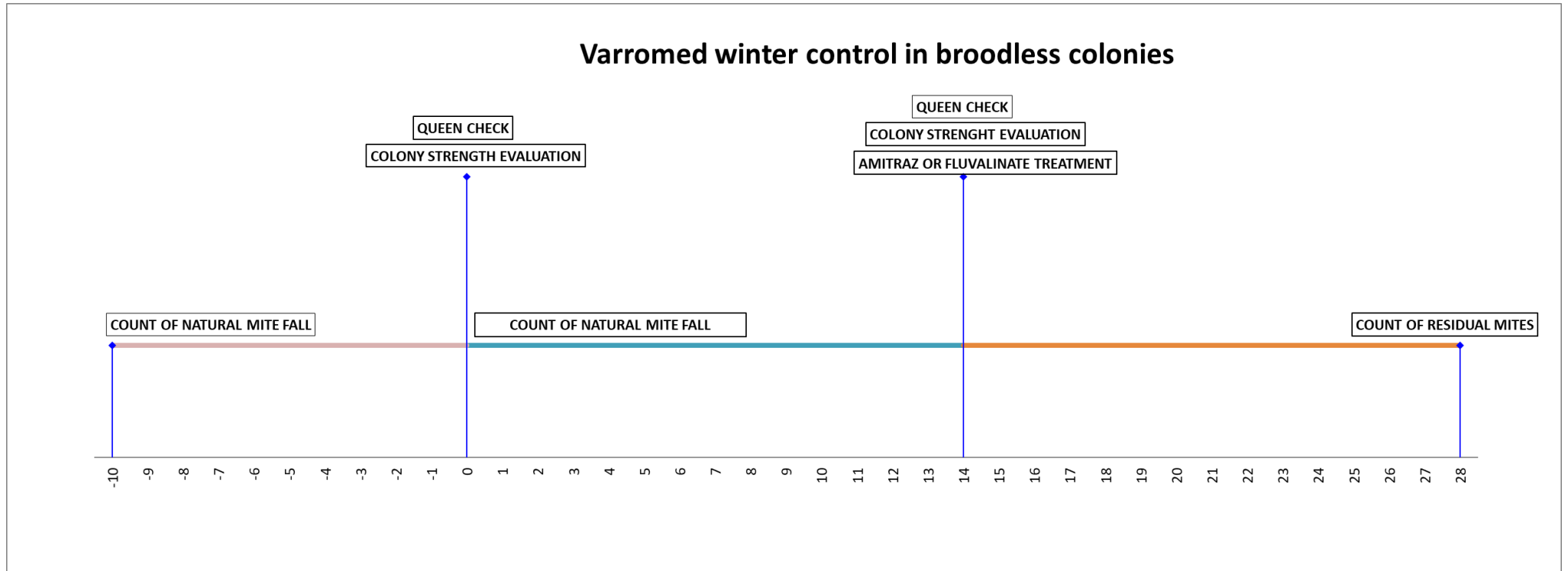
Protocols

The protocols, divided according to the season, are as follows:

1. WINTER PROTOCOL



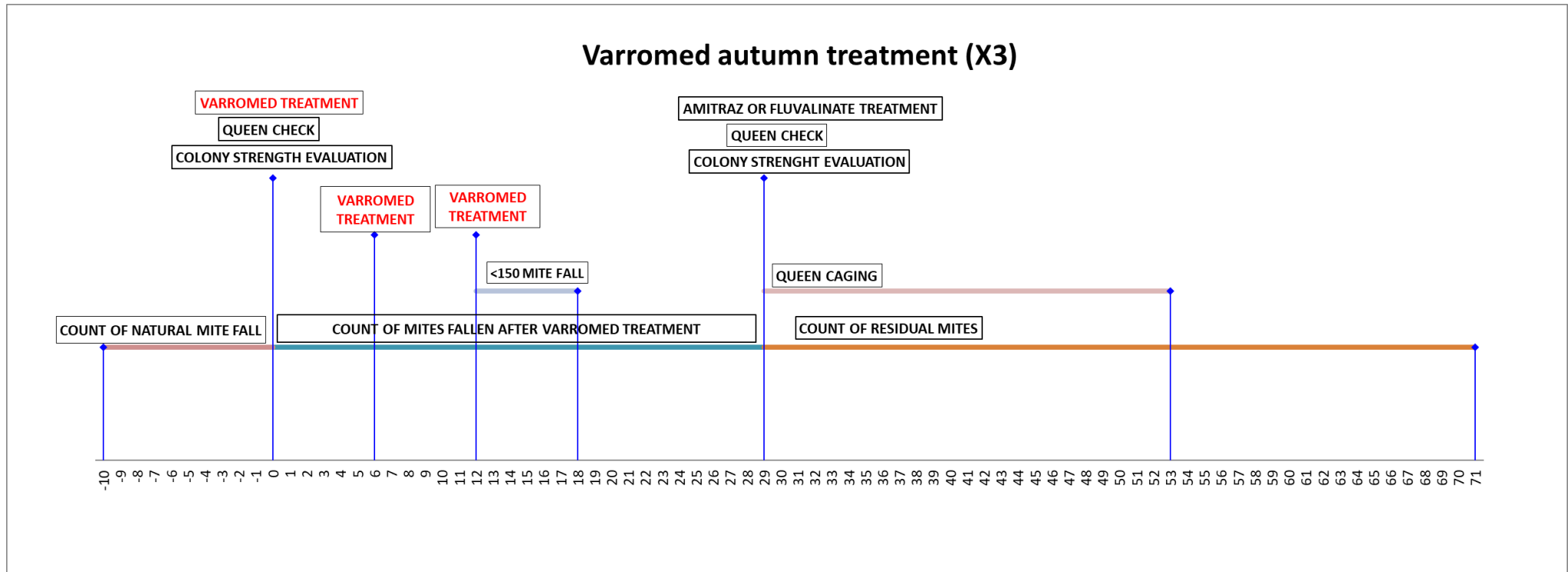
Graph 1: Winter protocol for the treated group in the absence of brood



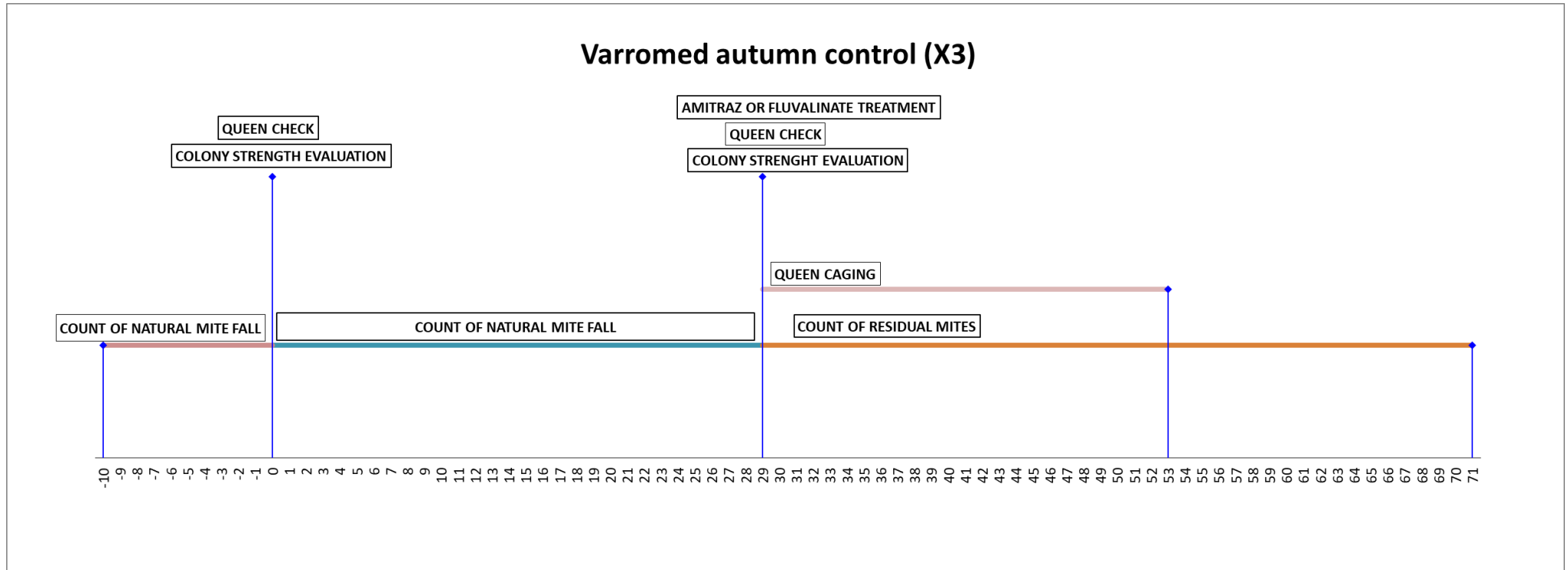
Graph 2: Winter protocol for the control group in the absence of brood

2. AUTUMN (AND SUMMER) PROTOCOL

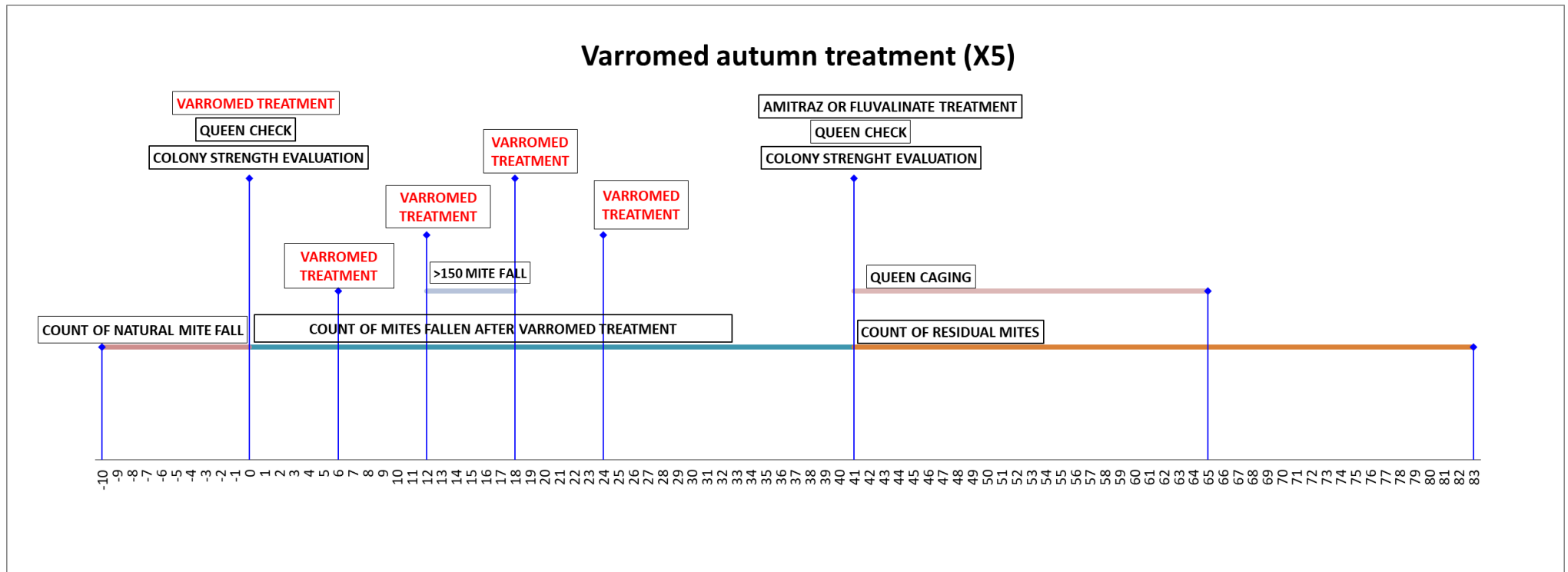
The number of administrations of Varromed® for each treated colony vary by the number of fallen mites (see the protocols below).



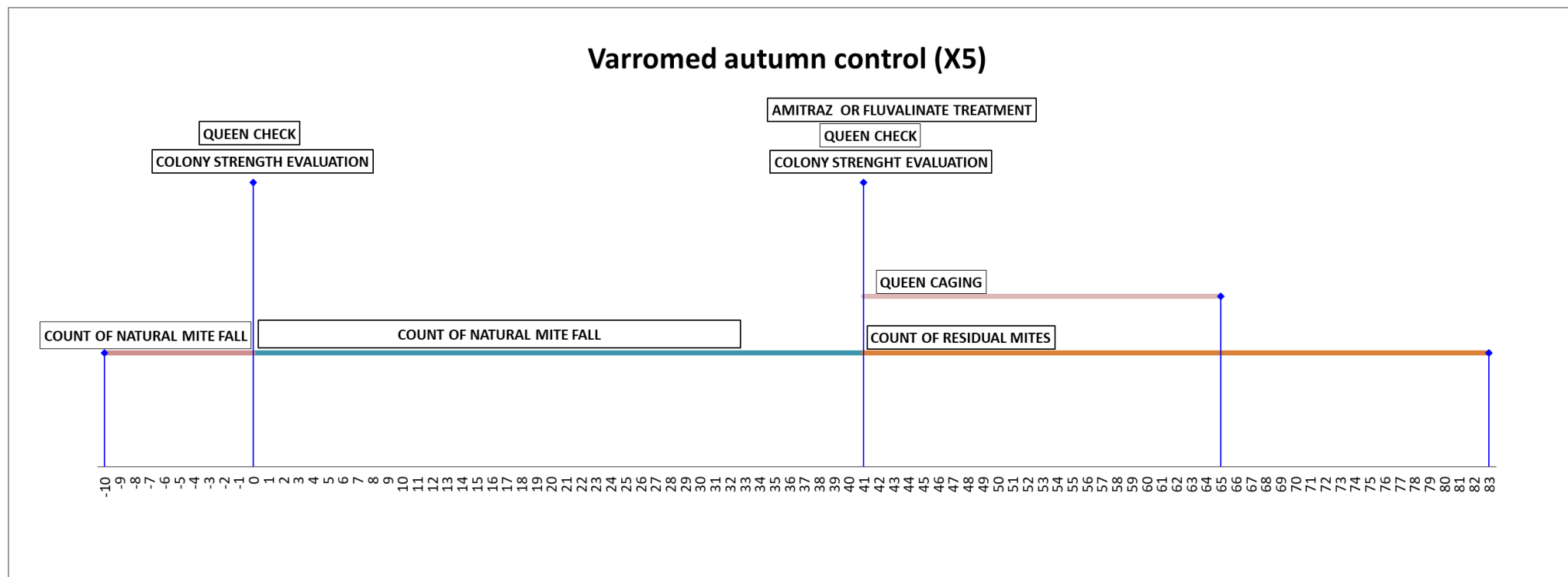
Graph 3: Autumn protocol for colonies with **less** than 150 mites fallen during the 6 days after the third application



Graph 4: Autumn protocol for the control group colonies (x3)



Graph 5: Autumn protocol for colonies with **more** than 150 mites fallen during the 6 days after the third application



Graph 6: Autumn protocol for the control group colonies (x5)

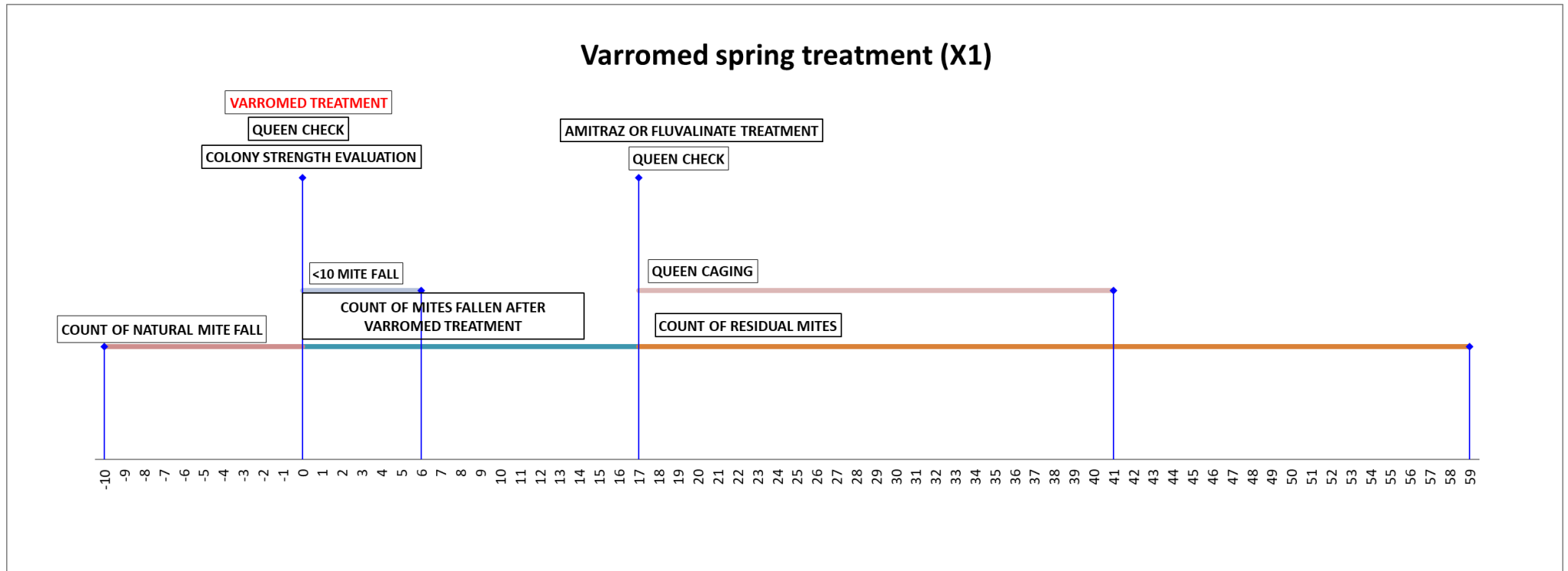
The selection of the protocol (choosing the short or long one) for the Control colonies, will be made based on:

-When **only the short protocol** will be applied **in all the colonies of the treated group (Autumn x3, Protocol 3)**, the **short control protocol (Autumn x3 control protocol, Protocol 4)** will be followed for all the colonies of the control group.

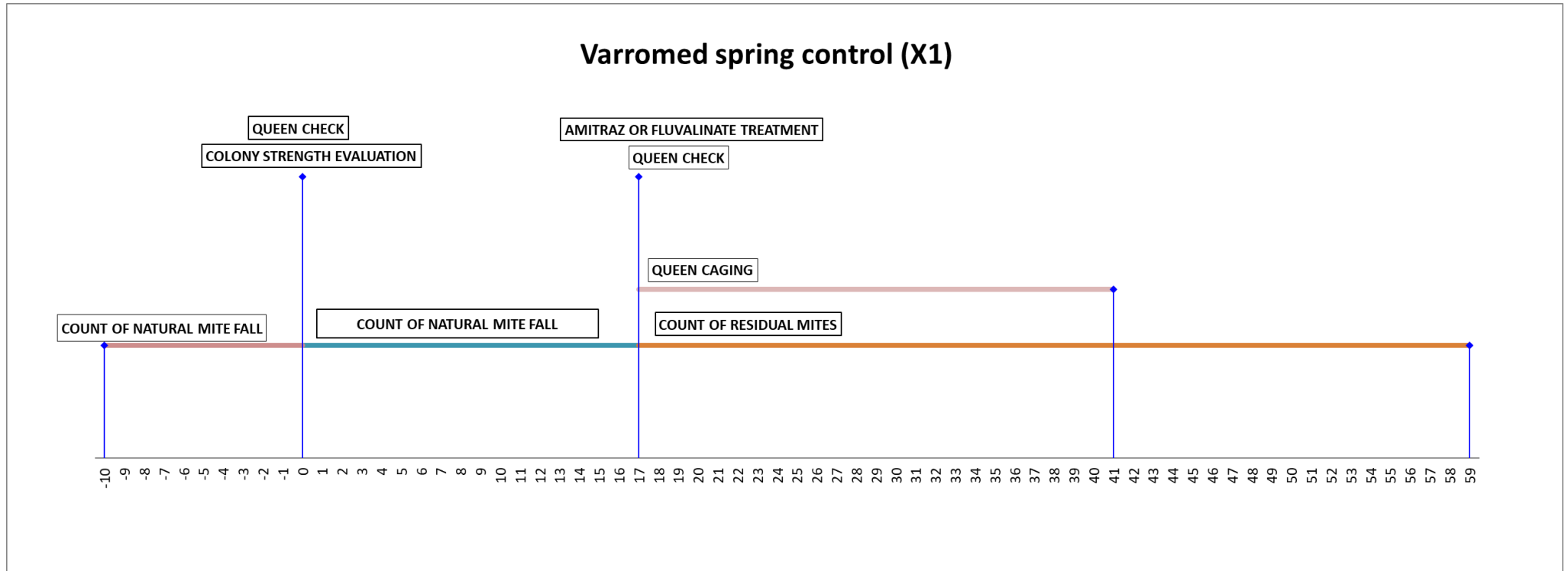
-When **one or more** colonies of the treated group will follow the **long protocol (Autumn x5, Protocol 5)** (due to a mite fall as indicated in the protocols), the long control protocol will be applied to every single colony of the control group (Autumn x5 control protocol, **Protocol 6**).

3. SPRING PROTOCOL

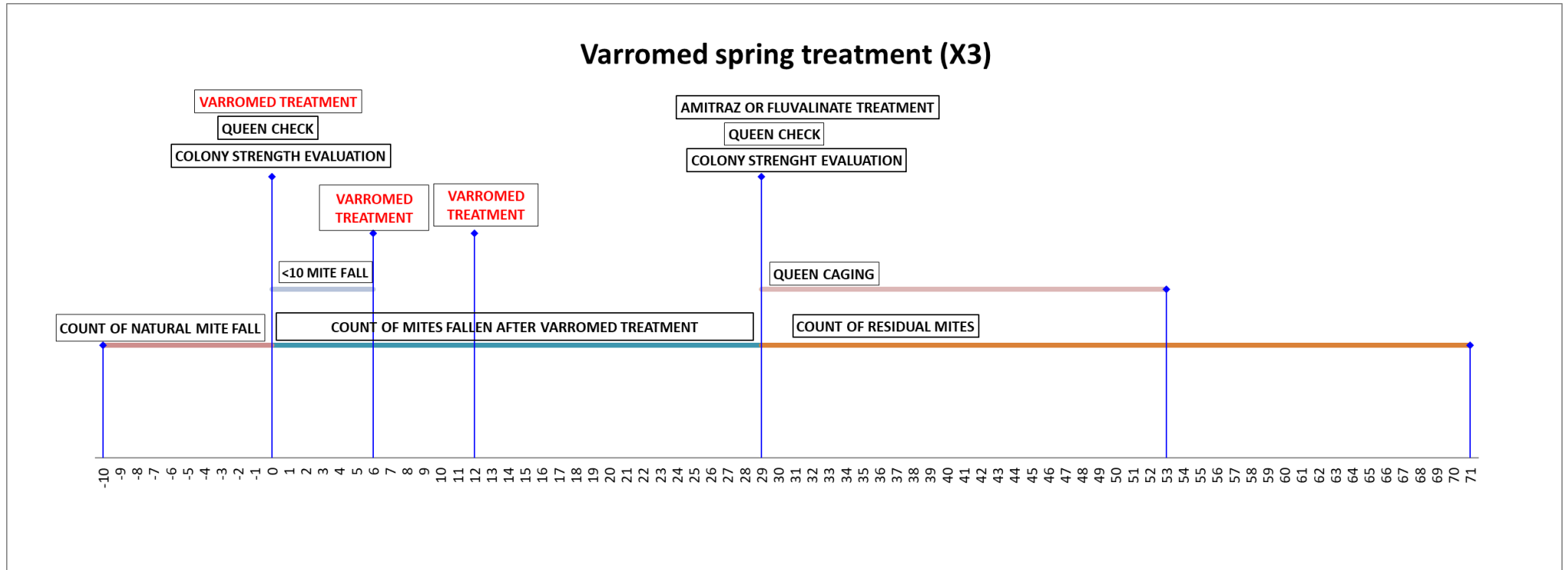
The number of administrations of Varromed® for each treated colony vary by number of mites fallen (see the protocols below).



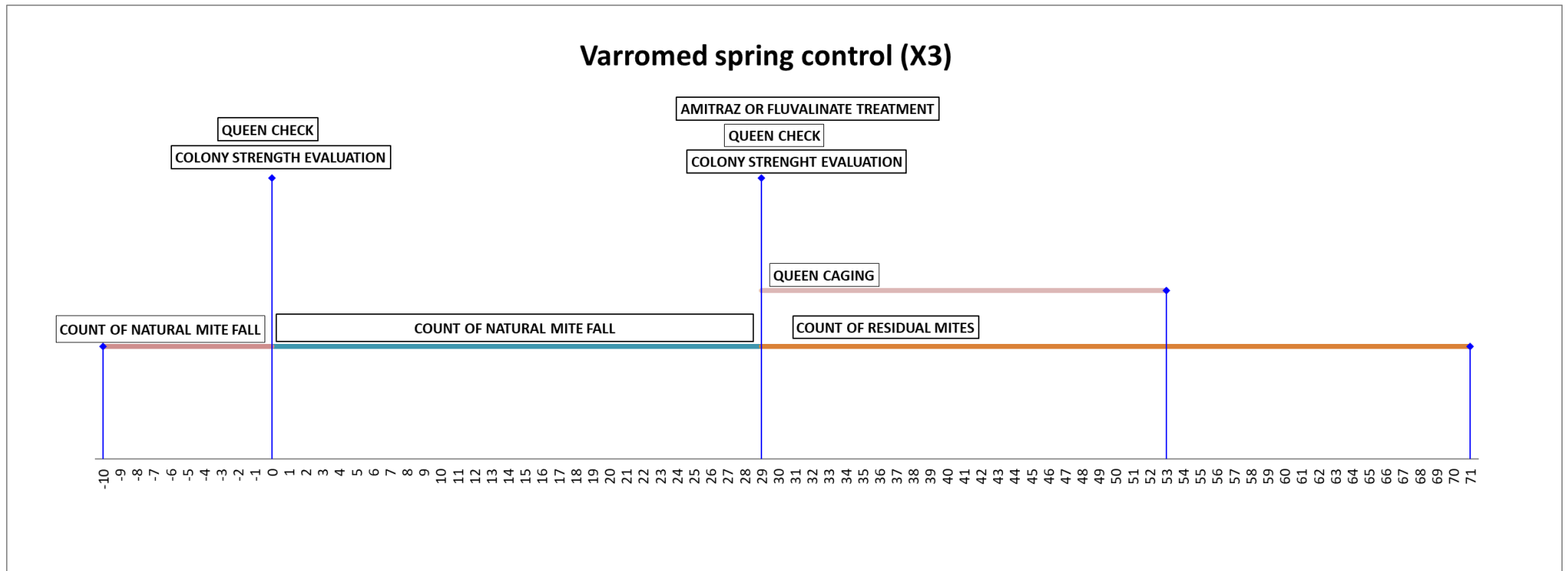
Graph 7: Spring protocol for colonies with **less** than 10 mites fallen during the 6 days after the treatment



Graph 8: Spring protocol for the control group colonies (x1)



Graph 9: Spring protocol for colonies with **more** than 10 mites fallen during the 6 days after the first application



Graph 10: Spring protocol for the control group colonies (x3)

The selection of the protocol (choosing the short or long one) for the Control colonies, will be made based on:

-When **only the short protocol** will be applied **in all the colonies of the treated group (Spring x1, Protocol 7)**, the **short control protocol (Spring x1 control protocol, Protocol 8)** will be followed for all the colonies of the control group.

-When **one or more** colonies of the treated group will follow the **long protocol (Spring x3, Protocol 9)** (due to a mite fall as indicated in the protocols), the long control protocol will be applied to every single colony of the control group (**Spring x3 control protocol, Protocol 10**).