M a n u a l

for

Calculation Program

CALDOC

Work Time Calculation

in

Landwirtschaftlichen **I**nformations-**S**ystem **L**andtechnik

>>> L I S L <<<

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Note: Change to DOS Settings (click upper side left):
Font: Lucida Console 16 (or 18)
Color: Background „blue“

Please note:

LISL was developed in the 70s of the last century in German language only.

The system CALDOC is a subsystem of LISL. It contains only the models of indoor farming. From this, in turn, only the models of “**Dairy Farming**” with their titles and the associated influencing variables have been translated into English.

Important dialogs in the FORTRAN Program CALDOC are adapted to the English language, but still German grammar is in it!

Of course, CALDOC can also be used in German language for all other models of indoor farming with the mentioned leading model numbers (n)

- Bull fattening husbandry (1)

- Calf husbandry (3)

- Heifer husbandry (4)

- Solid and liquid manure application (8)

Their outputs into the "**Workload File**" and the “**Result File**” are output by CALDOC in English layout, but the “**Listing**” is originally still in German!

In the case of the system use possibly still following outputs in German language are possible and should not contribute to the confusion.

Table of contents

1. System LISL

L I S L, the "Agricultural Information System for Agricultural Engineering", was developed at the Institute for Agricultural Engineering in Weihenstephan between 1971 and the mid-1990s. In parallel, it was used at the "Swiss Federal Research Station for Farm Management and Agricultural Engineering (FAT)" in Tänikon (Switzerland).

In Weihenstephan, the system was developed based on the dissertation AUERNHAMMER, H., http://mediatum.ub.tum.de/?id=982881, using the example of bull fattening. For the first time, a program-supported working time calculation based on work elements was realized in the FORTRAN IV programming language. The data storage was shifted into a "quasi-relational database" and contains there all necessary information for the respective model as a "document". This contains in 10 sections the required metadata, the respective model influencing variables with preset values (defaults), the corresponding working time demand function and for the first time ever with workload values according to the energy consumption method. The models are assigned to different levels, these represent the following contents:

Level	*Name*	*Model numbers*	*Contnet*
0	HV	1 – 9	Main influencing variables with effect on all models located below for use in iterative calculations (not calculable)
1	GA	10 – 99	Total work models for the main production processes
2	VG	100 – 999	Process models
3	TV	1000 – 9999	Sub-process models
4	EL	10000 – 99999	Element models with specific adjustments of the required standard times to sub-process models)
5	PL	100000 – 100999	Worktime standards (Task times) based on mean values or functions with statistical parameters and the associated workload values according to the Energy Consumption Method

The models follow the deterministic approach. This means that the corresponding workflow is calculated from mathematically specified worktime standards (determined via time studies with statistical validation) by aggregating them up to the required scope of work (level TV to level GA). In the respective models, great importance was attached to the realistic workflow, which is why the calculations also represent a workflow plan.

In this model approach all calculations are always based on the only once existing worktime standards, which show a largely timeless validity with the work method contained in it (e.g. the walking speed of a working person will change only little also in the future!)

Beginning with the bull fattening a successive completion took place over the dairy cattle husbandry (SAUER, H., http://mediatum.ub.tum.de/?id=820199, the calf husbandry and the young cattle rearing. Subsequently, manure spreading was included in the model approach and thus the calculation area of indoor farming was completed as "Subsystem KALINN".

Finally, the working procedures in sow husbandry (HAIDN, B., http://mediatum.ub.tum.de/?id=820149) were processed in a separate "KALSAU subsystem".

Parallel to the work in Weihenstephan, the FAT focused on the field of outdoor farming and implemented the necessary models in the "KALAUS subsystem". In addition, this subsystem also contains many different models for indoor farming based on Swiss labor relations. It should be noted, however, that in all models of the FAT the worktime standards are always represented in the form of mean values, which means that their adjustment to reality can only be made in the areas of validity specified there. Also the model texts from the punch card time were not converted into the normal writing and no energy consumption values were included in these models!

In addition to the working time calculation, the largely independent calculation program KalDok (calculation with documents) was also used by corresponding model areas for the calculation of the necessary material and investment requirements for agricultural farm buildings (KALBAU) in NACKE, E., http://mediatum.ub.tum.de/?id=820158, for the analysis of machine costs (KALKOS) in WENDL, G., http://mediatum.ub.tum.de/?id=820176 and for the investment requirements of biogas plants (KALBIO) in SCHÄFER, R., http://mediatum.ub.tum.de/?id=984245.

The currently available version of "KalDok V8B" as a DOS program, starting from pure use in batch mode via punch cards, has been extended again and again and adapted to the current user requirements. At present it can be used in

- Batch use (data input via file with predefined job structure)
- Dialog (single value input)

This English-language program CalDoc corresponds in content to the original German version KALDOK.

2. General system and usage information

The present version of LISL with the program CALDOC contains only the subsection KALINN and was updated for general use from the research data in the AgTecCollection in mediaTUM. The system is located in the directory LISL with the associated subdirectory. For the use of the English version CALDOC of LISL the following notes have to be observed:

The system CALDOC with the working time calculation is always started \LISL\" under Windows by tapping twice on "Caldoc.bat". In this procedure then a DOS window opens and requires first the calculation form (Dialog or BATCH).

Usually, the dialog form is selected first (the batch form is more recommended for experienced users). This opens the start window of CalDoc for a corresponding calculation, whereby the respective number of the "session" is shown in the second line on the right. This number will be found in all generated output files!

The inputs required in the dialog are queried in each case line by line one after the other and are to be concluded after an appropriate input in each case with a <RETURN>. Please note:

- An empty input always leaves the respective preset value (default), if this is available. Otherwise a repetition of the input is requested!
- With numeric inputs, a zero only becomes a zero if the number "0" is typed in for it!

- For the Yes/No (Y/N) questions, only a "Y" or "y" is a yes, otherwise all other entries are a "No"!

For all calculations (dialog and batch), only the final result is displayed on the visual display unit. On the other hand, according to the selected output form, the detailed results are always written to the "listing file" in MS-DOS format.

In one session, any number of calculations can be performed, whereby either a previously processed model is calculated repeatedly with different input values or a new model is selected in each case.

The end of the session must be confirmed separately, whereby the system returns to the Windows interface. There the generated files are available with the session number "nnn" as file identifier. The following files are generated per session:

CalDoc_Listing-nnn.txt

Contains the workflow with all substeps and the overall result. The line length is 120 characters. This file should be opened with MS-Word, and the file type "DOS" should be selected. With landscape format and the font size 10 Courier or Courier New, a very good page-appropriate preparation for further use or printing takes place.

CalDoc_DialPRM-nnn.dat

This file contains the dialog inputs in a batch file format. It can thus be used for repeated calculations to specifically change one or more influencing variables (Please note the job structure according to the description in the appendix). **Important**: This file is only in “dialog mode” established!

CalDoc_Results-nnn.csv

Contains the final results of a calculation in CSV format as direct input into EXCEL.

CalDoc_WloadEC-nnn.dat

Here, the individual values for the energy consumption method are documented in order to be able to process them in a differentiated manner in a follow-up analysis with the program EUSANA. For this purpose, all work elements involved are listed next to the model headings. For these, columns 10 to 92 contain the assignments to the working position and the working type. Columns 93 - 116 contain the corresponding energy consumption values.

3. Application notes for the interactive calculation with CALDOC

The CALDOC (**Cal**ulation with **Doc**uments) program is used for all calculations. This program is linked by your program start input in each case with the data required for it. You should use this program exclusively in the dialog form (DIAL). For a first test you can use the provided batch files (more details in appendix 2):

- Pen1-TV-Milking.dat
- Pen2-VG-Milking.dat
- Pen3-GA-Milking.dat

- Pen4-VG-Blindmilking.dat
- Pen5-207-Milking-Iterat.dat

For specialists, but also for serial calculations, however, the pure BATCH form (PARM) can also be used, see the required job structure in appendix 5!

Please note the following when using the program:

Surcharge calculation: With -1 any surcharge is eliminated. The 0 adds the surcharge value contained in the elements from time studies. With a value higher than 0 element based surcharges plus e.g. the input of the number 5 to the total result, a surcharge of 5 % could be made for "personal times of the working person". In the case of calf husbandry production methods, this value should be designated with the number 10.

Calculation type: In general, the process-oriented calculation type (activity 1) should be selected, in which the required work stages are logged in the form of the work process. The iterative calculation (activity 2), on the other hand, is reserved for real influence quantity analyses (only one influence variable is to be changed step by step per calculation). Activities 3 and 4 are intended to provide the user with an overview of the available models and their possible uses, thus facilitating the choice of the model to be calculated.

Print output extent: This is used to control the output for the results. The lower the value specified for this parameter, the more extensive the log will be. Select the value 1 to get all model information and especially for milking “Waiting Times and “Blind Milking Time per Cow” (the default value is 2).

Number of calculated models: For better verification, only one model should be selected at a time. The additive linking of several models makes sense at most at the end of a comprehensive calculation, if the entire work of several sections is to be carried out with it on an overall result in each case.

Model number: See under 4.1.3 and 4.2.3

Read model content: Important when attempting to calculate the model for the first time, as the description usually shows the model structure and often also hints on model limitations. ***Note: Content description not translated to English!***

Change of influencing variables: Here the possibility offers itself to adapt models to the demands with the influence variables. This is done by the following 3 forms, in case of a further calculation with the same model a 4th form is possible.

0 = ***Do not change*** any influence values, if you want to work with all preset values (usually the initial form for the beginner and for "getting a feel").

1 = ***Change all*** influence quantities means that all influence values are output by the computer for modification and can then be overwritten as desired.

2 = ***Change only*** the most important influence values means that only influence values defined by us as important are output by the computer for modification. (If the computer does not output any influence values with this setting, this means that the required model change has not yet been carried out by us. In these cases, choose to change a l l influence quantities).

3 = ***Targeted changes*** is only possible for a subsequent calculation with the same model. The influence values of the previous calculation are left and individual influence values can be changed selectively. This is recommended for repeated calculations of a model if the influence values are changed only slightly.

N o t e : A blank entry leaves the preset value.

A numeric input replaces the preset value.

If no further influence values are to be changed, the overwriting process is aborted by entering s or e (stop, end). For the remaining influence values, the preset value is left !

Post-processing of the influence values: After the influence quantities have been changed, the program offers a correction option for any subsequent changes. There are three possibilities to choose from:

0 = All entries correct: The final completion of the overrides with the regular continuation of the calculation.

1 = Make specific changes: The targeted change of one or more influencing variables to be named with the number (e.g. in case of input errors).

2 = Repeat entire input: The complete change of all influencing variables again.

4. Work Time Culculation

A program and corresponding data are required for simulation. All working time data are stored in specific models and, depending on the aggregation level, is correctly linked.

4.1 Cattle Husbandry

As mentioned above besides Bull fattening husbandry, Calf husbandry, Heifer husbandry and Solid and liquid manure application only Dairying is translated into English in the available database

4.1.1 Program

For the calculations the already mentioned program CALDOC is used, which could be made error-free to a large extent in about 15,000 program runs so far (at present version V8B is used).

The program is started with ***Caldoc.bat***

4.1.2 Database

The currently available models are based on about 80,000 individual time measurements from practical operations. Extensive comparative studies have shown that the conditions in practice can be calculated with a deviation of plus/minus 5 %.

The models are classified into 5 levels. For the calculation, the strongest aggregation on level 2 (total work) should be assumed. If the corresponding model does not cover the planning alternative, then it is possible to go down one level. However, in this case, the links between the individual operations must be made by the user.

Please take the respective model headings for the overall work level and the operation level from the following lists.

4.1.3 Models

The models almost always adhere to a very strict hierarchy. This makes the linkage relatively easy for the user to see through. The following example may demonstrate this:

Total work model 20 consists of activity models 200 - 209. Process model 200 in turn builds on the sub-process models with the numbers 2000 to 2099. These models themselves then fall back on the element models 20000 to 20999 and so on. Only below this level is the hierarchy deviated from, because on level 6 (work time standards, also called task times) only the numbers 100000 to 100999 are occupied (for the time being).

4.1.3.1 Total working models

Number Model-Description

——

20 Dairy farming in tied-up stalls with pocket milking plan
21 Dairy farming in tied-up stall with pipe line milking pl
22 Dairy farming in cubicle houses, herringbone milking par
23 Dairy farming in cubicle houses, rotary milking parlour

4.1.3.2 Process models

200 Setup-work at feeding begin
201 Fill concentrate feed into bucket and distribute it
202 Load silage to feed barrow, transport and distribute si
203 Feeding of roughage
204 Pasturing work
205 Mucking and bedding by hand work or mechanical assistan
206 Refinishing work at feeding end
207 Milking in tied-up stall with bucket or pipeline milker
208 Extra work (windows cleaning, barn painting etc.)
209 Service work according to animals
211 Filling of concentrate feed into barrow and distributio
214 Summer barn-feeding
217 Milking in herringbone or rotary milking parlour
219 Special work for reproduction (pregnancy, birth)
225 Cleaning & bedding of cubicle boxes in loose housing sy
252 Frontl./bunker sil. unloader feed mixing wagon, distrib

4.1.3.3 Sub-process models

2000 Setup-work at feeding begin
2001 Cleaning of feeding trough
2002 Load trash from feeding trough and move it away
2010 Take concentrate feed from bin and distribute by hand
2013 Fill feeding barrow with conc. feed from silo / unload
2020 Load silage from silo to barrow, transport and distrib
2030 Move hay by hand work from haystack to feeding table
2031 Distribute hay from feeding table into feeding trough
2040 Preparation work at farm yard before getting green fod
2041 Drive with tractor from farm yard to field
2044 Cut and load green fodder in same pass
2045 Unload green fodder with scraping floor to feeding tab
2046 Distribute green fodder from feeding table to feeding
2047 Replace fence at pasture to new grazing area
2048 Fill water tank trailer and prepare for use
2049 Force animals to or from pasture
2050 Move muck in tied-up barn from laying stall
2051 Mucking in tied-up stall with barrow
2052 Carry straw by hand work from stack to dung passage
2053 Bedding with straw in tied-up stall

2054 Cleaning of dung passage with stable broom
2060 Cleaning (brushing) of feeding table
2061 Monitoring walk
2062 Refinishing work at end of feeding
2070 General preparation work before milking
2071 Set-up work for milking in tied-up stall
2072 Milking with bucket milking plant in tied-up stall
2073 Refinishing work after milking in tied-up stall
2074 Cleaning of milk churn or milk tank
2075 General preparation work after milking
2080 Cleaning of windows in barn
2081 Painting of barn (inside)
2082 Disinfection of barn (also cleaning)
2083 Cleaning of dung passages
2084 General cleaning of milking plant
2090 Claw manicure in cattle crate
2094 Insemination of a cow
2095 Treatment of udder before dry period
2096 Assistance during calf birth
2111 Distribute conc. feed with feed barrow with outlet
2120 Unload silage from bunker silo with rotary unloader
2123 Distribute silage with feed mixing wagon
2150 Mucking with mechanical dung channel scraper
2170 Milking in tied-up stall with pipe line milking plant
2250 Cleaning of cubicles in loose housing system
2251 Bedding of cubicles in loose housing system
2270 Push cows in loose housing system to waiting room
2271 Set-up work before milking in milking parlour
2272 Milking in herringbone parlour
2273 Refinishing work after milking in milking parlour
2274 Cleaning of milking parlour and waiting room
2372 Milking in rotary milking parlor

4.1.3.4 Work time elements

20000 Go to barn door
20001 Open door
20002 Close door
20003 Go to origin of feeding trough
20004 Go to barn gate
20005 Open gate
20006 Push full feeding barrow
20007 Pull empty feeding barrow
20008 Push feeding barrow to origin location
20009 Retrieve hand tool for silage distribution
20010 Retrieve hand tool for feeding trough cleaning
20011 Go to next feeding trough

20012 Return to origin of feeding trough
20013 Replace working tool
20014 Re-distribute silage in feeding trough
20020 Push trash barrow to trash storage place
20021 Push full trash barrow to trash storage place
20022 Return with empty trash barrow to barn
20023 Replace hand tools and trash barrow to parking area
20024 Load trash from feeding trough on trash barrow
20100 Go to storage place of concentrate feed
20130 Go to concentrate feed storage silo
20132 Go from silo emptying point to transport unit
20200 Go to silage barrow
20201 Push silage barrow to silo
…
…
…
22000 !!! ---> B l i n d m i l k i n g !!!
22500 Retrieve shovel for cleaning of cubicle house boxes
22501 Take muck out of cubicle boxes
22502 Go to next feed trough
22511 Bedding of sawdust to cubicle boxes
22702 Force cows into the waiting space
22703 Force cows after milking together
22710 Go to milking parlour
22711 Additional preparation work in milking parlour
22720 Catch cows into milking parlour in whole groups
22724 Release cows from milking parlour in whole groups
22730 Cleaning of dairy room
22731 Additional refinishing work in milking parlour
22740 Cleaning of milking parlour

4.4 Example of the input sequence of the CALDOC program

A complete dialog flow of a session is shown below.

Start with ***CalDoc***

```
Worktime Calculation with System LISL, Database TUM-Weihenstephan
------------------------------------------------------------------

Special version of LISL (Agricultural Information System Ag-Technology)

Whole database is available, but only Dairying models in English,
all others in German only!

Numbers of adapted models in English language are:
   20 Dairying in "Tied-up stalls"
   21 Dairying in "Loose Housing Systems"
  207 Milking  in "Tied-up stalls"
  217 Milking  in "Loose Housing Systems"
```

```
Please note:   Not all texts of the variables are tanslated !!!


What would you like to do?:
   1 = Worktime calculation for Dairying or milking with above shown models
   2 = Analyzing Workload Files according to energy consumption

What's your choice ....                                    ? 1

Usage of CalDoc:
   1 = Dialog
   2 = Batch-Mode with Parameter File (xx... .prm)

What's your choice ....                                    ? 1

One Moment please (Init-File established) !



L I S L  AgEng Systems Engineering Weihenstephan, 2020-12-21  C A L D O C (V7A)
-------------------------------------------------------------------------------
         (C) Dr. H. Auernhammer, Weihenstephan 2009, 2015 (Run      4)
Data Source: Worktime Calculation based on Data from TUM-Weihenstephan

This program enables the simulation of work time requirements of Animal and
Plant Production Systems in accordance with several influencing parameters
either by their defaults or by user-defined parameters.

The program may be used in two different ways :

D i a l o g  (DIAL)                Program controlled interactions

B a t c h  by File-Input (PARM)    Controlled from user named batch-file with
                                   DOS-Command  .:\> caldoc <Parameter_file

Please make your choice   (DIAL, END  or  <Return>=DAIL) !
----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+
DIAL

What is the surcharge for your simulation !
         -1 ===> Without any surcharge
          0 ===> Surcharge by elements only (malfunction, others)
         >0 ===> Surcharge by elements + percentage surcharge!  ? <Return>

Choose next activity :
    1 = Calculation of one or more models
    2 = Iteration of one parameter in a model
    3 = Show Headlines (titles) of models on screen
    4 = Show Parameters of one model on screen
    9 = End of Session
Make your choice (0=1) !                                   ? <Return>
How many models should be added together (0=1) ?           ? <Return>
    !!!  Output of results will be in print file  !!!
Model-description also into print file (y/n) ?             ? <Return>
What is your type of Protocol  (0=1) ?
(1=all, 2=to TV, 3=to VG, 4=to GA, 5=Result only)          ? <Return>


What is the number of the Model you want !                 ? 207
Read model-description (y/n)  ?                            ? <Return>

Use of parameters :
    0 ==>  N o   change
    1 ==>  Change    a l l   parameters
```

```
    2 ==>  Change only the   m o s t  i m p o r t a n t   ?
Make your choice !                                        ? <Return>

No.        Simulation by work sequenz       Summarized working time (MPmin)
-------------------------------------------------------------------------

TV   2070  General preparation work before milking                    .87
TV   2071  Set-up work for milking in tied-up stall                  4.88
TV   2170  Milking in tied-up stall with pipe line milking plant     45.15
TV   2073  Refinishing work after milking in tied-up stall          53.
TV   2074  Cleaning of milk churn or milk tank                      55.58

TV   2075  General preparation work after milking                   56.45

What is the time of husbandry (0=365 days) ?                      ? <Return>
What is the number of operations/day (0=2) ?                      ? <Return>

The total results taken from the print-file are :
-------------------------------------------------

Total herd size of                                  20   Animals

Working time per animal/day                        5.6 MPmin =      .09 MPh
Working time per day total                       112.9 MPmin =     1.88 MPh
Duration of work per day                         112.9 MPmin =     1.88 MPh

Related to a keeping time of                                     365    Days
Working time per animal                                           34.34 MPh
Working time of the whole herd                                   686.8  MPh

Mean energy consumption representing workload                     11.7  kJ/min
Rel. to energy consumption balance of Females (11.4 kJ/min)      102.3  %
 "    "    "        "         "    "  Males   (17.3 kJ/min)       67.4  %


Simulation finished (y/n)  ?                                      ? y

                  Regular  E n d  of  J o b !


Should workload be analyzed according to energy consumption? (y/n)  ..> y

!!! see EUSANA Manual !!!

Finish Calculation with  RETURN  ..>                              ? <Return>
```

5. Close session

In the batch file can be decided afterwards whether the analysis of the energy consumption data should follow. If 'Y', then EUSANA will follow with its dialog (if the program does not change to EUSANA, then restart "CalDoc" and select code 2)!

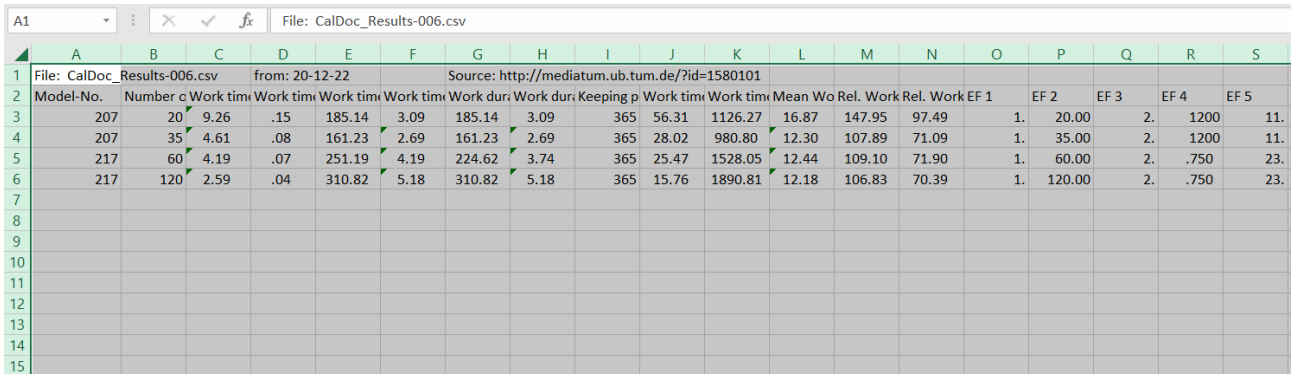
After this, the end of the dialog session must still be specifically confirmed, which returns the system to the Windows interface

Appendix 1: Output file (CalDoc_Listing-005.txt) in Word-Format

```
LISL --- C A L D O C (V7B) -Ag. Systems Technology Weihenstephan TUM- Source: http://mediatum.ub.tum.de/?id=1580101
-------------------------------------------------------------------------------------------------------------------------
CalCulation on: 2020-12-22                                                    Output File: CalDoc_Listing-005.txt

           Calculation is done with surcharge (malfunction, others) by Elements!


Model no.    207: Milking in tied-up stall with bucket or pipeline milker
-------------------------------------------------------------------------


Modellinhalt:
-------------
Die Arbeitsperson bereitet nach den allgemeinen Ruestarbeiten die Eimer- bzw.
Rohrmelkanlage fuer das Melken vor. Handelt es sich um eine Eimermelkanlage,
werden die Melkeimer vorbereitet, der Milchseier mit Filteranlage zusammenge-
setzt. Bei einer Rohrmelkanlage dagegen werden die Melkzeuge von der Spuel-
leitung genommen, die Milchleitung an den Tank angeschlossen und der Filter
...

Allocations to the model parameter:
-----------------------------------
 1. Frequency of occurance . . . . . .       1.000  Occurance(s)
 2.+Herd size  . . . . . .                   22.000  Cows
 3.+Number of stall rows . . . . . .          2.000  Rows
 4.+Width of feeding trough per cow  . . . . .       1.200  Meter
 5. Width of barn  . . . . . .               11.000  Meter
 6.+Milking plant: 0=Bucket, 1=Pipe line . . . .       .000
 7.+Number of milking units  . . . . . .      3.000  Buckets
 9.+Final milking with milking unit: 0=No, 1=Yes       1.000
12. Udder cleaning: 0=Dry, 1=Wet . . . . . .       1.000
14.+Milk storage: 0=Churns, 1=Tank . . . . . .       1.000
15.+Tank cleaning: 0=Manual, 1=Automatic . . . .       .000
16. Content of the milk tank   . . . . . .       8.000  100 liter
18.+Interval for milk delivery . . . . . .       2.000  Feedings
19.+Annual milk performance of the herd  . . . .    7000.000  Kilogramm
20.+Average main milk flow of the herd . . . . .       1.400  kg/Minute
21. Days of milking per cow and year . . . . . .     305.000  Days
22. Space of dairy room  . . . . . .        12.000  Square meter
23. Dist.: Begin of feeding trough - dairy room      10.000  Meter
24. Dist.: Dairy room - begin of stall rows  . .      15.000  Meter
26.+Number of milking persons  . . . . . .       1.000  Person(s)


Structure of work sequence  (Coding: GA=Total work, VG=W'instance, TV=W'part instance, EL=W'element, PL=W-standard)
-------------------------------------------------------------------------------------------------------------------------
  Model-                                                          Frequency   Working time (MPminutes) related to
Code  Number              Model description                                    PL/EL          GA      HV
-------------------------------------------------------------------------------------------------------------------------

 207  Milking in tied-up stall with bucket or pipeline milker    1.00
 2070  General preparation work before milking                   1.00
 20700  Go to dairy room                                        1.00     .1
 20001  Open door                                               1.00     .1
100905  Turn switch(es) on/off                                  1.00     .1
 20701  Retrieve apron                                          1.00     .2
 20702  Tie apron around                                        1.00     .4
                                                                          ------      .9

 2071  Set-up work for milking in tied-up stall                 1.00
100441  Put milking pail together                               3.00    3.0
 20712  Assemble milk strainer and include milk filter          1.00    1.0
 20713  Do additional preparation work in dairy room            1.00     .8
 20714  Turn milking plant on                                   1.00     .1
 20715  Fill bucket from water pipe                             1.00     .4
 20716  Carry bucket in barn                                    1.00     .2
 20312  Go back without task                                    1.00     .2
 20717  Carry milking pail in barn                              2.00     .7
 20312  Go back without task                                    1.00     .2
                                                                          ------     6.5

 2072  Milking with bucket milking plant in tied-up stall       1.00
 20720  Connect vacuum pipe                                    19.00    3.8
 21701  Wash udder with cleaning towel                          7.00    1.8
 21706  Clean udder                                            19.00    4.9
 21702  Return walk after udder cleaning                        7.00    1.2
 21707  Attach teat cup cluster                                19.00    5.3
 21708  Do final milking with teat cup clusters at udder       19.00   17.8
 21709  Remove teat cup cluster                                19.00    1.8
 20721  Disconnect vacuum pipe                                 19.00    3.8
 20722  Carry filled milking pail to dairy room                19.00   11.2
 20723  Emptying milking pail                                  19.00   21.8
 20724  Carry empty milking pail back to barn                  16.00    8.0
```

```
 !!! EL  22000  ---->   A t t e n t i o n:  Blind milking  (per cow)      1.31 min
                                                                            ------    81.4

 2073  Refinishing work after milking in tied-up stall           1.00
 20732  Switch milking plant off                                1.00     .1
100919  Prepare cleaning solution                               1.00     .3
 20737  Cleaning of milking pail                                1.00    2.7
 20738  Cleaning of teat cup clusters                           1.00    2.1
100450  Disassemble and clean milk strainer (Bucket milking p   1.00    2.0
 20739  Other refinishing work in dairy room                    1.00     .9
 22730  Cleaning of dairy room                                  1.00    1.6
                                                                            ------     9.7

 2074  Cleaning of milk churn or milk tank                       1.00
 20740  Preparation work for arrival of milk collection lorry    1.00     .4
100919  Prepare cleaning solution                                .50     .1
 20741  Manual cleaning of milk tank                             .50    1.3
100457  Manual cleaning of milk tank surface                     .50     .5
                                                                            ------     2.3

 2075  General preparation work after milking                    1.00
 20750  Draw apron out                                          1.00     .4
 20751  Restore apron                                           1.00     .2
    PL 100905  Turn switch(es) on/off                                  1.00     .1
 20002  Close door                                              1.00     .1
 20308  Return to point of origin                               1.00     .1
                                                                            ------      .9
                                                                                  -------   101.6
-------------------------------------------------------------------------------------------------------------------------

Total herd size of                                22   Animals

Working time per animal/day                      9.2 MPmin =      .15 MPh
Working time per day total                     203.2 MPmin =     3.39 MPh
Duration of work per day                       203.2 MPmin =     3.39 MPh

Related to a keeping time of                                    365    Days
Working time per animal                                        56.18 MPh
Working time of the whole herd                                1235.9  MPh

Energy consumption representing workload                        17.0  kJ/min
Rel. to consumption balance of Females (11.4 kJ/min)           149.4  %
 "    "      "         "    "  Males   (17.3 kJ/min)           98.4  %
```

Appendix 2: Output file (CalDoc_Results-006.csv) in csv-Format



A1 | File: CalDoc_Results-006.csv

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	File: CalDoc_Results-006.csv			from: 20-12-22			Source: http://mediatum.ub.tum.de/?id=1580101												
2	Model-No.	Number c	Work time	Work time	Work time	Work time	Work dura	Work dura	Keeping p	Work time	Work time	Mean Wo	Rel. Work	Rel. Work	EF 1	EF 2	EF 3	EF 4	EF 5
3	207	20	9.26	.15	185.14	3.09	185.14	3.09	365	56.31	1126.27	16.87	147.95	97.49	1.	20.00	2.	1200	11.
4	207	35	4.61	.08	161.23	2.69	161.23	2.69	365	28.02	980.80	12.30	107.89	71.09	1.	35.00	2.	1200	11.
5	217	60	4.19	.07	251.19	4.19	224.62	3.74	365	25.47	1528.05	12.44	109.10	71.90	1.	60.00	2.	.750	23.
6	217	120	2.59	.04	310.82	5.18	310.82	5.18	365	15.76	1890.81	12.18	106.83	70.39	1.	120.00	2.	.750	23.
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			

Appendix 3: Output file (CalDoc_DialPRM-005.dat) as Batch-File

```
PARM     1      00000102 0   10  0 0    0.    0.    0.  365.  22.   2.   0.   1.
Parameter for simulation in dialog session   #    4
   207 26     1.     22.      2.     1.2    11. -99999.      3.      4.      1.
         -99999. -99999.      1. -99999.     1. -99999.      8.     20.      2.
           7000.     1.4    305.     12.     10.     15.    100.      1.
ENDE
```

Available Test Parameter Files (in red the adapted values)!!!

Pen1-TV-Milking.dat (Pure milking time without preparation and finishing work in different milking systems)

```
PARM     1      00000102 0   10  0 0    0.    0.    0.  365.  15.   2.   0.   1.
Parameter     Bucket milking plant
  2072 15     1.     15.      2.     1.2    11.      2.      1.      0.   6000.
            1.6    305.      1.     10.     20.      1.
PARM     1      00000102 0   10  0 0    0.    0.    0.  365.  25.   2.   0.   1.
Parameter     Pipeline milking plant
  2170 14     1.     25.      2.     1.2    11.      4.      1.      0.      1.
          7000.     1.6    305.      1.      1.
PARM     1      00000102 0   10  0 0    0.    0.    0.  365.  60.   2.   0.   0.
Parameter     Herringbone parlor
  2272 14     1.     60.      8.   7000.     1.6    305.      1.      1. -99999.
         -99999. -99999. -99999.      1.      1.
PARM     1      00000102 0   10  0 0    0.    0.    0.  365. 120.   2.   0.   0.
Parameter     Rotation parlor
  2370 15     1.    120.     12.   7000.     1.8    305. -99999.      1. -99999.
              1. -99999.      1. -99999.    2.25      1.
ENDE
```

Pen2-VG-Milking.dat (Milking process including preparation and finishing work in different milking systems)

```
PARM     1      00000102 0   10  0 0    0.    0.    0.  365.  20.   2.   0.   1.
Parameter     Bucket milking system - 20 cows
   207 26     1.     20.      2.     1.2    11. -99999.      3.      4.      1.
         -99999. -99999.      1. -99999.     1. -99999.      8.     20.      2.
           7000.     1.4    305.     12.     10.     15.    100.      1.
PARM     1      00000102 0   10  0 0    0.    0.    0.  365.  35.   2.   0.   1.
Parameter     Pipeline milking system - 35 cows
   207 26     1.     35.      2.     1.2    11.      1.      2.      4.      1.
         -99999. -99999.      1. -99999.     1. -99999.      8.     20.      2.
           7000.     1.4    305.     12.     10.     15.    100.      1.
PARM     1      00000102 0   10  0 0    0.    0.    0.  365.  60.   2.   0.   1.
Parameter     Herringbone parlor milking system - 60 cows
   217 38     1.     60.      2.     .75    23.      2.      1. -99999.     10.
             10.   7000.     1.4    305. -99999. -99999.      1.      1. -99999.
         -99999. -99999. -99999.      1.      1.    2.25      1.      1. -99999.
             30.     10.      1.      1.     16.      2.     15.     10.     10.
              5.      1.
PARM     1      00000102 0   10  0 0    0.    0.    0.  365. 120.   2.   0.   1.
Parameter     Rotary parlor milking system - 120 cows
   217 38     1.    120.      2.     .75    23.      2.      1.      1.     10.
             10.   7000.     1.4    305. -99999. -99999.      1.      1. -99999.
         -99999. -99999. -99999.      1.      1.    2.25      1.      1. -99999.
             30.     10.      1.      1.     16.      2.     15.     10.     10.
              5.      1.
ENDE
```

Pen3-GA-Milking.dat (Daily husbandry working time)

```
PARM     1      00000102 0   10  0 0    0.    0.    0.  365.  15.   2.   3.   1.
Dairying in tied-up stall, bucket milking plant
    20 98     1.    365.     15.      2.      1.      2.     1.1      3.      1.
```

```
             50.      .55    180.      1.      2.      0.      2.      0.      0.
             80.       0.     15.     10.      1.      0.      1.      2.      4.
              1.       0.      0.      2.     14.      1.     11.     50.    150.
             40.    1500.    200.      1.      1.      1.      1.      0.      0.
              1.       2.     40.      0.      0.      1.      0.    1.65     30.
         -99999.      1.2 -99999.      4. -99999. -99999.      1.      .9      1.
              1.       2.      1.      1.      1. -99999.      8.     20.      2.
           7000.      1.4    305.     12.      1.     20.      4.     40.      4.
              4.       2. -99999. -99999.     28.     28.      1.      1. -99999.
              1.       2.      2.     20.     40.     10.    100.      6.
PARM     1      00000102 0   10  0 0    0.     0.     0.  365.  30.   2.   3.   1.
Dairying in tied-up stall, pipeline milking plant
…
…
…
ENDE
```

Pen4-VG-Blindmilking.dat (Test of Waiting time or Blindmilking in different milking systems)

```
PARM     1      00000102 0   10  0 0    0.     0.     0.  365.  15.   2.   0.   1.
Parameter Bucket milking system - Default values
   207  0
PARM     1      00000102 0   10  0 0    0.     0.     0.  365.  40.   2.   0.   1.
Parameter Bucket milking system - Blind milking
   207 26     1.      40.      2.     1.2     11.      1.      2.      6.      1.
              0.       0.      1.      0.      1.      0.      8.     20.      2.
           4000.     2.2    305.     12.     10.     15.    100.      1.
PARM     1      00000102 0   10  0 0    0.     0.     0.  365.  15.   2.   0.   1.
Parameter Pipeline milking system - Default values
   207 26     1.      30.      2.     1.2     11.      1.      2.      4.      1.
              0.       0.      1.      0.      1.      0.      8.     20.      2.
           7000.     1.4    305.     12.     10.     15.    100.      1.
PARM     1      00000102 0   10  0 0    0.     0.     0.  365.  15.   2.   0.   1.
Parameter Pipeline milking system - Blind milking
   207 26     1.      30.      2.     1.2     11.      1.      2.      4.      1.
              0.       0.      1.      0.      1.      0.      8.     20.      2.
           4000.     2.4    305.     12.     10.     15.    100.      1.
PARM     1      00000102 0   10  0 0    0.     0.     0.  365.  15.   2.   0.   1.
Parameter Herringbone parlor milking system - Default values
   217 38     1.      60.      2.     .75     23.      2.      1.      0.      8.
              8.    7000.     1.4    305. -99999. -99999.      1.      1. -99999.
         -99999. -99999. -99999.      1.      1.    2.25      1.      1. -99999.
             30.      10.      1.      1.     16.      2.     15.     10.     10.
              5.       1.
PARM     1      00000102 0   10  0 0    0.     0.     0.  365.  15.   2.   0.   1.
Parameter Herringbone parlor milking system - Blind milking
   217 38     1.      60.      2.     .75     23.      2.      1.      0.      8.
              8.    4000.     2.4    305. -99999. -99999.      1.      1. -99999.
         -99999. -99999. -99999.      1.      1.    2.25      1.      1. -99999.
             30.      10.      1.      1.     16.      2.     15.     10.     10.
              5.       1.
PARM     1      00000102 0   10  0 0    0.     0.     0.  365.  15.   2.   0.   1.
Parameter  Rotary parlor milking system - Waiting time
   217 38     1.      80.      2.     .75     23.      2.      1.      1.      6.
              6.    7000.     1.4    305. -99999. -99999.      1.      1. -99999.
         -99999. -99999. -99999.      1.      1.    2.25      1.      1. -99999.
             30.      10.      1.      1.     16.      2.     15.     10.     10.
              5.       1.
PARM     1      00000102 0   10  0 0    0.     0.     0.  365.  15.   2.   0.   1.
Parameter Rotary parlor milking system - Blind milking
   217 38     1.      80.      2.     .75     23.      2.      1.      1.     12.
             12.    7000.     1.4    305. -99999. -99999.      1.      1. -99999.
         -99999. -99999. -99999.      1.      1.    2.25      1.      1. -99999.
             30.      10.      1.      1.     16.      2.     15.     10.     10.
              5.       1.
Ende
```

Pen5-207-Milking-Iterat.dat (Iteration of Herd size)

```
PARM     0      00000602 0   10  3 2   14.    40.    2.  365.  14.   2.   0.   1.
Iteration Milking in tied-up stall, bucket milking plant, 2 units
   207 26     1.      0.      2.     1.2     11. -99999.      3.      4.      1.
         -99999. -99999.      1. -99999.      1. -99999.      8.     20.      2.
           7000.     1.4    305.     12.     10.     15.    100.      1.
ENDE
```

Appendix 4: Output file (CalDoc_WloadEC-005.dat) as Input File “EUSANA”

```
File:  CalDoc_WLoadEC-005.dat         from: 2020-12-22              Source: http://mediatum.ub.tum.de/?id=1580101
Model: VG    207  Milking in tied-up stall with bucket or pipeline milker
TV   2070  General preparation work before milking
EL  20700    .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .132 11.0  3.8  14.8
EL  20001    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .125  2.5  3.8   6.3
PL 100905    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .090  2.5  3.8   6.3
EL  20701    .0  .0  .0  .2  .0  .8  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .166  9.3  3.8  13.1
EL  20702    .0  .0  .0 1.0  .0  .0  .0  .4  .0  .0  .3  .0  .0  .3  .0  .0  .0  .0  .0  .0    .357  2.5  5.1   7.6
TV   2071  Set-up work for milking in tied-up stall
PL 100441    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0   3.000  2.5  9.8  12.3
EL  20712    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0   1.000  2.5  7.3   9.8
EL  20713    .0  .0  .0  .8  .0  .2  .0  .0  .3  .0  .0  .0  .0  .7  .0  .0  .0  .0  .0  .0    .761  4.2  6.1  10.3
EL  20714    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .090  2.5  3.8   6.3
EL  20715    .0  .0  .0 1.0  .0  .0  .0  .0  .5  .0  .0  .0  .5  .0  .0  .0  .0  .0  .0  .0    .370  2.5  6.1   8.6
EL  20716    .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .198 11.0  3.8  14.8
EL  20312    .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .198 11.0  3.8  14.8
EL  20717    .0  .0  .0  .0  .2  .8  .0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0    .692  9.6 12.3  21.9
EL  20312    .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .198 11.0  3.8  14.8
TV   2072  Milking with bucket milking plant in tied-up stall
EL  20720    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0   3.768  2.5  3.8   6.3
EL  21701    .0  .0  .0  .3  .0  .7  .0  .0  .6  .0  .4  .0  .0  .0  .0  .0  .0  .0  .0  .0   1.760  8.5  4.8  13.3
EL  21706    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0   4.944  2.5  9.8  12.3
EL  21702    .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0   1.191 11.0  3.8  14.8
EL  21707    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0   5.316  2.5  9.8  12.3
EL  21708    .2  .0  .8  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  17.756  4.2 10.0  14.2
EL  21709    .0  .0  .0  .8  .0  .2  .0  .0  .0  .0  .0  .4  .0  .0  .6  .0  .0  .0  .0  .0   1.829  4.0  8.4  12.4
EL  20721    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0   3.768  2.5  3.8   6.3
EL  20722    .0  .0  .0  .0  .2  .8  .0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  11.173  9.6 12.3  21.9
EL  20723    .0  .0  .0  .3  .3  .4  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  21.803  6.4 21.0  27.4
EL  20724    .0  .0  .0  .0  .2  .8  .0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0   8.047  9.6 12.3  21.9
TV   2073  Refinishing work after milking in tied-up stall
EL  20732    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .090  2.5  3.8   6.3
PL 100919    .0  .0  .0 1.0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .277  2.5  3.3   5.8
EL  20737    .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .3  .0  .0  .7  .0  .0  .0  .0  .0  .0   2.688  4.0  6.3  10.3
EL  20738    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0   2.148  2.5  7.3   9.8
PL 100450    .0  .0  .0 1.0  .0  .0  .0  .0  .5  .0  .0  .0  .0  .0  .5  .0  .0  .0  .0  .0   2.000  2.5  6.6   9.1
EL  20739    .0  .0  .0  .8  .0  .2  .0  .0  .3  .0  .0  .0  .0  .7  .0  .0  .0  .0  .0  .0    .866  4.2  6.1  10.3
EL  22730    .0  .0  .0  .8  .0  .2  .0  .0  .0  .0  .3  .0  .0  .0  .7  .0  .0  .0  .0  .0   1.645  4.2  8.0  12.2
TV   2074  Cleaning of milk churn or milk tank
EL  20740    .0  .0  .0  .4  .0  .6  .0  .0  .2  .0  .0  .0  .0  .8  .0  .0  .0  .0  .0  .0    .387  7.6  6.5  14.1
PL 100919    .0  .0  .0 1.0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .139  2.5  3.3   5.8
EL  20741    .0  .0  .0  .5  .5  .0  .0  .0  .0  .0  .0  .6  .0  .4  .0  .0  .0  .0  .0  .0   1.274  3.3  6.7  10.0
PL 100457    .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0    .463  4.0  8.8  12.8
TV   2075  General preparation work after milking
EL  20750    .0  .0  .0 1.0  .0  .0  .0  .4  .0  .0  .3  .0  .0  .3  .0  .0  .0  .0  .0  .0    .357  2.5  5.1   7.6
EL  20751    .0  .0  .0  .2  .0  .8  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .166  9.3  3.8  13.1
PL 100905    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .090  2.5  3.8   6.3
EL  20002    .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .125  2.5  3.8   6.3
EL  20308    .0  .0  .0  .0  .0 1.0  .0  .0  .0  .0 1.0  .0  .0  .0  .0  .0  .0  .0  .0  .0    .132 11.0  3.8  14.8
```

Appendix 5: Job setup for the "CALDOC" program

Line sequence for working time calculation

Parameter line
Heading line (Heading of the model calculation) } Insert as often as you like
Model selection line (n times, if EF-no. > 9 with modification
END line

Note:

The names of the variables used in the lists below following the column specifications decide on the form of the entry during the input!

The rules according to FORTRAN IV apply, according to which the first letter in the name

A – H and O – Z **Real value**, enter arbitrary in data field with dot

I – N **Integer value,** which is to be entered right-justified.

Data scheme for the parameter line

Columns	Variable	Description with specific input instructions
1 - 4	A	Mandatory the word PARM
5 - 7	B	Not used
8 - 9	IPRUEB	Not used
10	IBPROT	Not used
11 - 16	ITEST	Model number, on which the auxiliary variables and influence values should be tested
17	IGATES	≠ 0, GA } *print variables for test at this level*
18	IVGTES	≠ 0, VG
19	ITVTES	≠ 0, TV
20	IELTES	≠ 0, EL
21 - 22	IPROT	Listing parameter (empty=2) 1 = Listing all models down to the PL-level 2 = Listing all models down to the TV-level 3 = Listing all models down to the VG-level 4 = Listing only models at the GA-level 5 = Only final results are listed
23 - 24	ISW	Not used
25 - 26	ISTOER	≠ 0, -1 with no surcharge, >0= percentage of surcharge
27 - 30	MODELL	Number of models to be calculated (models are linked additively)
31 - 34	ITERAT	Number of the main variable, which is to be changed iteratively via the parameters START, END and STEP (if 0, then the parameters IPROT = 5 and IGATES and IGATES, IVGTES, ITVTES, IELTES = 0 are set.
35 - 36	KAPIT	Model area no., here it's "2" for Dairying
37 - 42	ANFANG	Start point } when ITERAT ≠ 0
43 - 48	ENDE	End point
49 - 54	SCHRIT	Step size

56 - 60	ZLEF 1	Keeping duration (Days)
61 - 65	ZLEF 2	Herd size (Animals)
66 - 70	ZELF 3	Feedings / day

Heading line (Heading of the model calculation)

1 - 80 UEBER The text entered on this line will be entered in the listing as the heading of the model calculation and printed at the beginning of the report.

Model selection lines

A selection line (possibly with subsequent lines for overwriting) is required for each desired model. These lines are to be entered as follows:

Column 1 - 6	MODNR	Model number	
7 - 9	NUEB	Number of overwritings	
10 - 16 17 - 24 25 - 32 33 - 40 41 - 48 49 - 56 57 - 64 65 - 72 73 - 80	UEB	Overwritings to this model (The order of the model must be observed!) The following rule applies:	

If the preset value is used, then the corresponding field must be left empty. The change of a preset value is made by entering this value in the corresponding field. If a preset value is to be set to >zero<, then a -9999999 must be entered in the corresponding field!

If more than the first 9 preset values have to be changed on a model, then subsequent lines must be used for this. Columns 1 - 9 remain empty on these lines; they can also serve as continuation indicators.

END line

Column 1 - 4 The word ‘Ende’