

## System CalDoc (Adapted English Version of LISL)

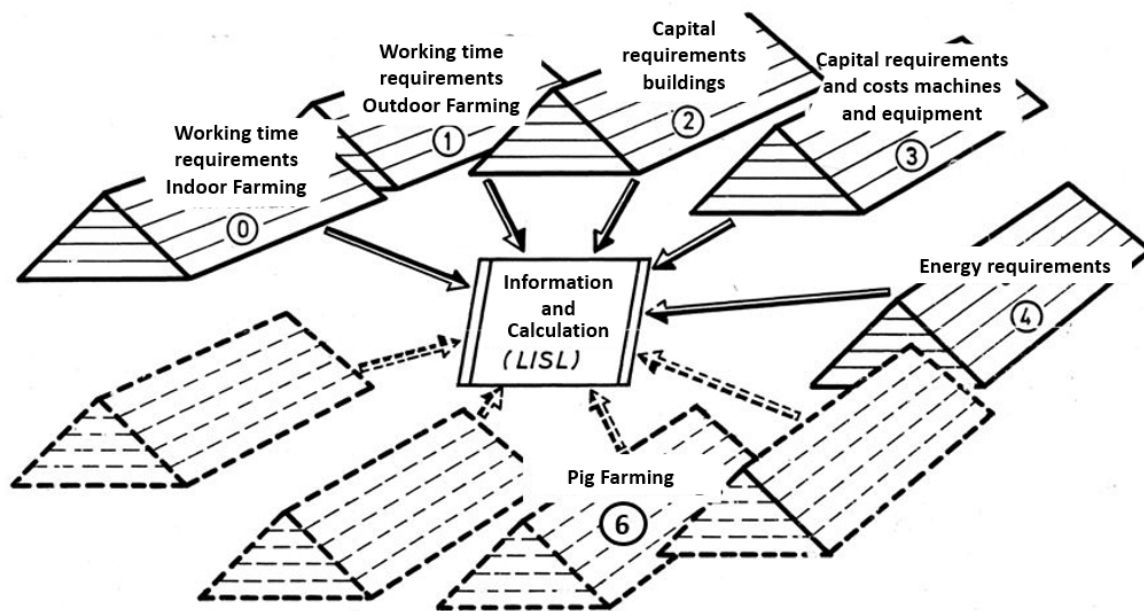
The "Agricultural Information System for Agricultural Engineering (LISL)" was developed between 1974 and 1986 in the DFG Collaborative Research Center 141 "Production Techniques for Cattle Farming".

The system is based on deterministic simulations, in which given standards are additively linked over several levels depending on statistically secured influencing variables. A variety of output options allow the presentation of results at the desired level of aggregation.

During the duration of the Collaborative Research Center, subsystems for the calculation of working hours in indoor livestock management (KALINN), the calculation of construction costs (KALBAU), the calculation of costs of agricultural machines and equipment (KALKOS) and for the use of biogas plants (KALBIO) were developed.

In continuation already during the Collaborative Research Center and also later, extensions and updates were carried out by working time calculations for sow keeping (KALSAU).

In addition, the integration of working time data for indoor livestock management and mainly for field work (KALAUS) from the cooperation with the "Eidgenössische Forschungsanstalt in Tänikon FAT" (Switzerland) was carried out. LISL was used and maintained at both locations for many years.

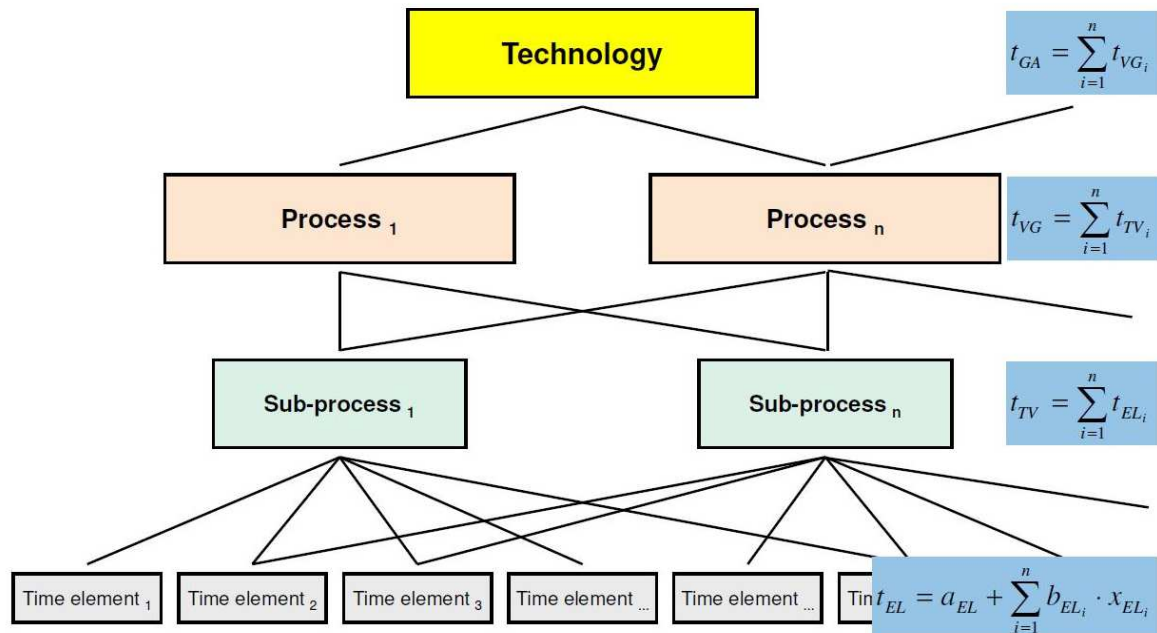


System LISL with calculation areas

All parts of the system have been maintained and adapted up to the present day in accordance with the further developed MS operating systems up to Windows 10. Due to missing data updates, the areas KALBAU and KALKOS were removed from LISL.

**Important:** CalDoc was established in a restricted version of LISL for test reasons in English. Only the models of dairying and milking were translated to English. There may still be some German text in both, the calculation program as well as in the data base!

## Database



Data structure adding time elements to sub-processes and processes

In the available system the calculation is based on working time elements from time studies and from the system of predetermined times MTM in the base level. As standards they are arranged in so-called documents according to a uniform scheme in up to 10 sections with exactly 80 columns and a maximum of 100 lines. It contains:

Section 1: Heading, document structure data, validity with start and end, creation and changes with time and author(s).

Section 2: Workflow description with special notes.

Section 3: Influencing variables with preset value (mean value from the time studies), dimension, identification to iterable main variables.

Section 4: Free for expansion.

Section 5: Data acquisition scheme for the influencing variables in the standard working time elements (Level 6: 100000-100999).

Section 6: Standard working time elements (Level 6: 100000-100999) with static parameters as mean values or functions.

Specified work time elements (level 5: 10000-19999) with specific element texts and reference to the standard work time elements.

Working time models with required auxiliary variables and the required sub-models/working time elements for sub-processes (level 4: 1000-9999), processes (level 3: 100-999) and total work (level 2: 10-99).

Section 7: Work load data according to HETTINGER & SPITZER in the standard work time elements (Level 6: 100000-100999).

Section 8: Free for expansion.

Section 9: Free for expansion.

### **Form of calculation**

The calculation is performed by the FORTRAN-IV program KALDOK (calculation with documents). Since the program was originally designed for punch card use, the further development of the present version has resulted in three different ways of use, which are used via the first four letters:

PARM Input from file, definition of the file structure in the application notes.

DIAL Input in dialog as standard usage.

Different result outputs and result protocols can be created.

### **Presentation of results**

Regardless of the input form the following protocols can be created. These are based on the calculation levels EL=elements, TV=sub-process, VG=process and GA=total Work in dairying. They contain the outputs in 5 different forms:

Protocol form 1: All additively linked elements.

Protocol form 2: The additively linked elements by level TV.

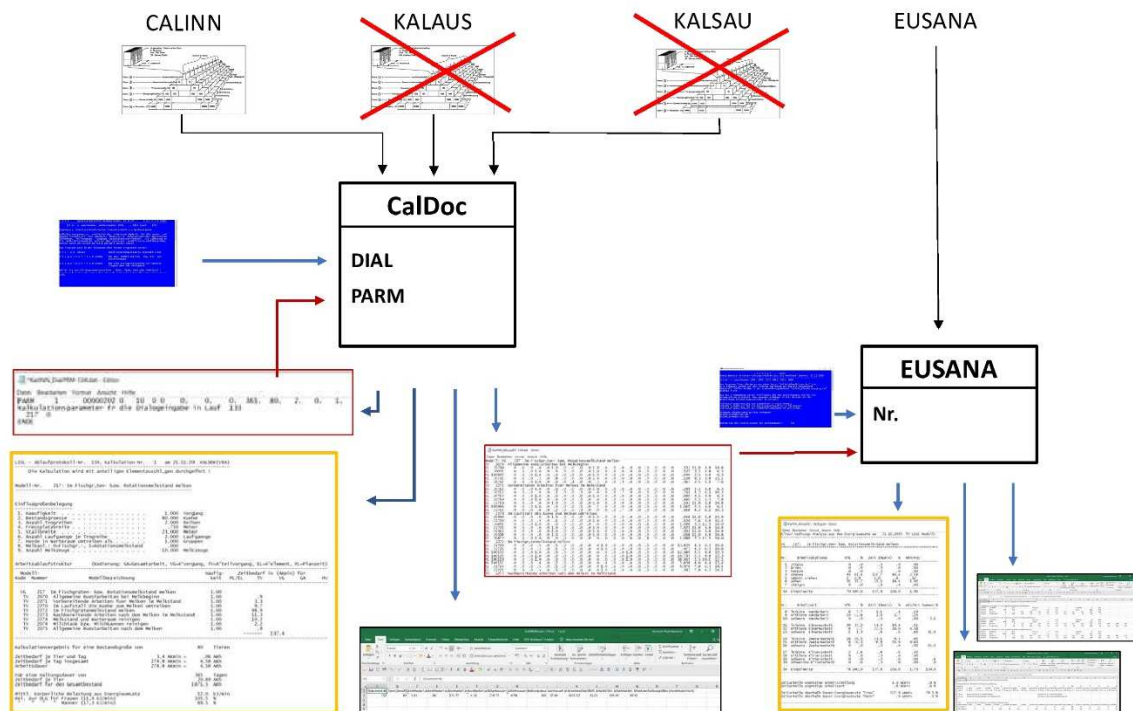
Protocol form 3: The additively linked elements by level VG.

Protocol form 4: The additively linked elements by level GA.

Protocol form 5: Only the overall result

Test routines contained in the program CALDOC can only be used via a Parameter input file. With these, the complete documentation of all activities performed in the program is possible!

## CalDoc Worktime Calculation (MS-DOS Batch Job „CalDoc.bat“)



DOS Batch-Job with Input and Output

### Output of results

In general, 4 ASCII output files are created. These files are named with

Program\_output type-calculation number.file\_type

Exemplary results for CALDOC in dairying and calculation no. 111 are these:

- Caldoc\_DialPARM-111.dat Contains the data for input in PARM-format. This allows, for example, the respective calculation to be repeated or simply adapted by making appropriate changes without having to make all the entries in the dialog. Note: File is only in “dialog-mode” established!
- Caldoc\_Listing-111.txt The result protocol with 120 columns depending on the desired content form.
- Caldoc\_Results-111.csv The overall results in csv format for EXCEL-based further processing.
- Caldoc\_WLoadEC-111.dat All data for the analysis of the working position and type of work for input into the evaluation program EUSANA (Energy Consumption Analyses).

## **EUSANA (Energy Consumption Data Analysis)**

This program is used to prepare and analyze the energy-consumption data of the working elements involved in the respective model. The program can be started directly after the model calculation or can be called up specifically.

In the program run of CALDOC, a data line with the energy consumption values and the body positions is created for each working element involved. From this a tabular summary is then calculated for the working position and the type of work with frequency and time share in absolute and relative values. The results are presented in three output files, again shown at calculation no. 111:

Caldoc\_WloadEC-111\_Erg.txt Contains the results of the analysis in tabular form with a summary evaluation at the bottom.

Caldoc\_WloadEC-134\_EUS.csv Used to create an energy consumption profile in EXCEL with all necessary data.

Caldoc\_WloadEC-134\_KPA.csv Used to create a profile for body position and type of work in EXCEL with all necessary data.

### **General information**

The present program and data package can be used by everyone without restrictions, as long as the sources are cited according to scientific criteria.

Changes to the programs are possible and should be reported to the author.

Assistance for necessary program adaptations can be provided by the author on request and in corresponding agreement.

The present system out of the milking tasks is written in German language. It can be used in CalDoc too but needs knowledge in the German language! For this it's better to use the German version of LISL with all the model for Indoor-farming, Pig farming and for Outdoor-farming (<https://mediatum.ub.tum.de/1455922>).

The system was tested without errors with Country Code 850 under Win10, Win7, WinXP and Win2000.

Contact to author: Hermann@Auernhammer.de