

## General Review of five PEDIGREE ANALYSIS SOFTWARE programs

One of the most important aspects in conservation programmes for endangered breeds is to restrain the rate of inbreeding.

We will introduce you in five software programmes which may help you in a useful way to manage your population. The presented programmes are focusing on different target groups and have different goals of interest. Because of the complexity of the software we will give you some details for orientation. If you need software help to manage your herdbook or to monitor the changes in genetic variability and population structure you should test the software with regard to your own needs.

### Animal Database ZVSN

is mainly a breeding program for the practical use in the field of conservation programmes, but with a lot of opportunities for recording characteristics and inbreeding analyses like identifying the genetical presence or inbreeding coefficients.

The target group are mainly Breed managers, herdbook keepers and persons responsible for population management in conservation programs.

Kurt Steiner can be addressed directly for support, data handling and data analyses.

### Breeders Assistant

is a pedigree and record keeping software program for breeders but it has also a lot tools regarding inbreeding, mating and genetic tools like the prediction of genetic geno- and phenotypes.

It comes with nice data integration possibilities via \*.csv (Excel) and \*.xml and a attractive design, especially pedigree outputs, and reporting features. But it is a commercial program, the personal version (modular costs) is about 130 €.

### ENDOG

is a Computer Program for Monitoring Genetic Variability of Populations Using Pedigree information.

Target group: Researchers or responsible persons for population management or teachers, students for population genetic analysis.

Primary functions carried out by ENDOG are the computation of the individual inbreeding (F) and the average relatedness (AR) coefficients.

Additionally, users can compute with ENDOG useful parameters in population genetics for the number of ancestors explaining genetic variability or for the genetic importance of the herds. Moreover, the present version of ENDOG can compute F statistics from genealogical information.

### Optimate

is a very fast Computer Program in a DOS prompt window for the registration and the simple working on genealogic data. It is a helpful tool for breeders to give information for mating and reducing inbreeding but the data integration is inconvenient.

### PEDSYS

PEDSYS (Pedigree Database System) is a series of programs written for management and analysis of genealogical and demographic data. It is in my opinion more a research tool and the installation process is not very easy to understand. But it can be used on the most important operation systems. The last version is from 1999, so it seems to be out of development now.

## Conclusion

The five presented software programs are helpful tools to manage animal populations and to avoid inbreeding. The choice for a program depends significantly of your needs and your computer knowledge.

If you have to run a small population and you have limited budget, than **Optimate** may be the right tool. If you want to do genetical analyses and you are experienced in computing and statistics, than **PEDSYS** or **ENDOG** may be your favourites. If you have the responsibility for a conservation program and you are not very experienced in dealing with data and analysis of inbreeding than **ZVSN** with support might be your option. For a broader management of animal population including veterinary data and an adequate reporting and contact management paired with basic computer knowledge you might spend little money for **Breeders Assistant**.

**Pedigree Software Programms (Technical details)**

<b>Name</b>	<b>Target group</b>	<b>Cost</b>	<b>Language</b>	<b>Server System</b>	<b>Progammig language</b>	<b>Data records (tested)</b>	<b>Speed</b>
<b>ENDOG</b>	Researchers or responsible persons for population management, teachers, students for population genetic analysis	free	englisch	Windows 95/98/2000/NT/XP	Visual Basic; Results in MS Access DB	75.000	75 000 records <5min (512MB RAM, 1.8GHzCPU)
<b>OPTIMATE</b>	Breed manager, herdbook keeper	free; complete version costs 55,- Euro	german	Windows (Prompt Mask), Windows 95/98/2000/NT/XP	Clipper, DOS-Surface	99.999	50-100MB RAM are recommended
<b>ZVSN</b>	Breed manager, herdbook keeper	Basic version about 200,-Euro; data integration and support about 30,-Euro	german	Windows 98 upwards/ MacOS 8.6 upwards	File Maker	30.000	32 MB RAM upwards
<b>PEDSYS</b>	Research tool	free	english	Unix, Windows, Mac OS	Fortran	30.000	
<b>Breeders Assistant</b>	Breeders, Rare Breed Breeders	Modular, personal edition Breeders Assistant (generic) e.G. 130,- Euro	english	Windows 95/98/2000/NT/XP		1.000.000	64MB RAM upwards

### Pedigree Software Programms (General overview)

Name	General Features	Usability	Experiences/ bugs	Download	Training/ Support
<b>ENDOG</b>	A Computer Program for Monitoring Genetic Variability of Populations Using Pedigree Information	after installation simple (pay attention to the right allocation of correct data fields)	Watch for correct input data, male=1; female=2	<a href="http://www.ucm.es/info/prodanim/html/JP_Web_archivos/Endog45.zip">http://www.ucm.es/info/prodanim/html/JP_Web_archivos/Endog45.zip</a>	
<b>OPTIMATE</b>	A Computer Program for registration and simple working on genealogic data. A helpful tool for breeders to give informations for mating and reducing inbreeding.	uncomfortable DOS orientated programm, fast calculation of gene rates	easy understandable and easy to install, interesting for small population, mass data input is uncomfortable	<a href="http://www.tiho-hannover.de/einrichtung/zucht/optimate/index.htm">http://www.tiho-hannover.de/einrichtung/zucht/optimate/index.htm</a>	The program is out of development now. Questions to: Tierärztliche Hochschule Hannover Institut für Tierzucht und Vererbungsforchung Tel.: 0511 - 953 8582
<b>ZVSN</b>	The animal database ZVSN is mainly a breeding programm for the practical use in the field of conservation programmes, but with opportunites for recording characteristics and inbreeding analyses.	Programm comes out of practical use, but a general affinity for computers is indispensable		<a href="http://www.zuchtbuchprogramm.com/index.php">http://www.zuchtbuchprogramm.com/index.php</a>	Programming help function, Training possible, support with data integrating and special programming adaptiones and live support via internet
<b>PEDSYS</b>	PEDSYS (Pedigree Database System) is a series of programs written for management and analysis of genealogical and demographic data	very unconvenient to install, Status of 1999		<a href="ftp://www.sfbr.org/pub/pedmgtpedsys">ftp://www.sfbr.org/pub/pedmgtpedsys</a>	<a href="ftp://www.sfbr.org/pub/pedmgtpedsys/PSManual.pdf">ftp://www.sfbr.org/pub/pedmgtpedsys/PSManual.pdf</a>
<b>Breeders Assistant</b>	Breeders Assistant is a pedigree and record keeping software program for breeders.	can integrate and export data e.g. via *.csv or *.xml, very comfortable design and data in- and output		<a href="http://www.tenset.co.uk/">http://www.tenset.co.uk/</a>	Tutorial Guide

**Pedigree Software Programms (Features)**

<b>ENDOG</b>	<b>OPTIMATE</b>	<b>ZVSN</b>	<b>PEDSYS</b>	<b>Breeders Assistant</b>
(F) individual inbreeding Wright 1931	Pedigrees for 4 generations	Genetical presence	<u>Pedigree Management (8 programs)</u>	It includes fully customizable printed pedigrees, text, image, HTML and circular pedigrees.
(AR) Average relatedness, Goyache-Gutierrez	Calculation of inbreeding coefficient from 2 up to 11 generations	Inbreeding coefficient	Finds common ancestors for selected probands	Many features for linechasers, kennel/cattery management and comprehensive record keeping.
Inbreeding per Generation	calculation of inbreeding for a planned mating	Extensive and praxis orientated data input management (Arrangement, ancestors, offspring, inbreeding, distribution, animal-project-person relationships, achievement census, assesment	Identifies pedigrees and assigns individuals to them	calculation of Wright's inbreeding coefficient.
Pedigree Content	Coefficients of relationships between groups and individuals	Rich search mask with the possibility to refine the search (upt to 20 steps)	Determines contribution of founders to subsequent generations	range of Reports available including ancestor and descendant analyses
Founders	Detection of the most important ancestors	Print with layouts for adress reports, genetical presence, inbreeding coefficients	Transforms pedigree data into Master File format	contracts/agreements area
Partial Inbreeding	Listing of all offsprings for every individual	grouping functions, interim grouping	Calculates inbreeding, kinship coefficients (Quaas-Henderson)	store all animal details, contacts, show records, litters, vet records, vaccinations, accounts and appointments/tasks.
Generation intervals	Extensive checks of plausibility		Constructs extended pedigrees for specified probands	genetics tools e.g. prediction of genotypes (coat color genetics, carried traits + diseases via simulation of Mendelian genetics)
Offspring analysis	Lots of characteristics can be recorded		Creates Pedigree/Draw formatted file from PEDSYS records	calculation of inheritance probability of specific genes

## Pedigree Software Programms (Features)

ENDOG	OPTIMATE	ZVSN	PEDSYS	Breeders Assistant
Subpopulations	Descriptive statistics and frequency distribution for every animal and individual can be computed		Assembles data for EGO, FA and MO on same record	modelling of polygenic traits and various statistical analyses
Coancestry	Export to *.csv or *.doc		<u>Genetic Management (7 programs)</u>	matings
Breeding Animals	Print report		Simplifies genotypic structure by combining alleles	Gene Frequency Analysis
Individual Pedigree			Calculates gene and genotype frequencies from phenotypic data	Covariance Analysis between relatives
Population Structure by Herds			Generates a Phenotype/Genotype map file	Inbreeding: The depth at which the furthest ancestor was found, How many generations of ancestors, Total number of ancestors found, Total number of unique ancestors, Total number of ancestors common to both sides of the pedigree
Supplying fathers, Grandfathers			Infers unknown genotypes from genotypes of relatives	backup and restoring opportunities
			Simplifies extended pedigrees for genetic analysis	
			Generates a peeling sequence from an indexed pedigree file	
			Tallies offspring genotypes by parental mating type	