PIGBLUP and the Year 2000

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Introduction

The Year 2000 Problem refers to the anticipated effects of past hardware and software design in which the clocks on computer chips were not designed to make the transition into the year 2000 correctly. In the past software writers chose to economise on scarce memory by storing only the last two digits of the year in date fields. As a consequence, on the 1 st January 2000 the date will be interpreted as 1 st January 1900.

The Animal Genetics and Breeding Unit (AGBU) has taken a number of steps to ensure that the much heralded Year 2000 problem will have no effect on its various commercial software packages when run on year 2000 compliant computer hardware and will make minimal demands on clients.

This paper describes those aspects of the problem that are the responsibility of the client, the aspects addressed by AGBU and the extent to which those aspects have been addressed at this time. In addition, a *fallback* mechanism is outlined in case of unanticipated problems.

Aspects of the Problem

1. *How the Problem Concerns the Client*

Firstly, clients need to check that their computer hardware is year 2000 compliant. Unlike many other commercial systems, it is not critical for PIGBLUP that at midnight on the 31st, December, 1999, the computer's date and time change correctly to 00:00 of 1 st January 2000!

The worst that can happen as far as a PIGBLUP run is concerned is that a client using *today* as the *End of Analysis Date* will have his/her PIGBLUP run abort because there were no data records in the *Start Year - End of Analysis Date* range. This would happen if the computer's clock switches to 1/1/1990 rather than to 1/1/2000. This can be remedied by correcting the computer's date in Windows or in MS-DOS and re-running the analysis.

Clients are advised to test their computer in advance by setting the date to 31st December 1999 and the time to 11:58 pm and checking that the computer's time and date make the correct transition into 2000.

The other relevant aspect that the client needs to check is that the herd recording system is year 2000 compliant. This matter should be taken up with the appropriate supplier.

2. *How It Concerns AGBU*

AGBU's concern is with the PIGBLUP software. In particular, it must be able to handle data files using the six digit day *day month month year year (ddmmyy*) date format correctly, observe the civilian (Gregorian) calendar's method of determining which years are *leap* years (ie., which have 365 days in the year and which have 366), sort output by date correctly, and display and report date information correctly.

PIGBLUP Year 2000 Compliance

1. *ddmmyy Dates*

AGBU's solution to handling dates correctly is for all date fields with *year year (yy)* greater than 50 to be interpreted as a *19yy* date and all date fields with *yy* smaller than *50* to be interpreted as *20yy* dates. To our knowledge, no client uses data prior to 1950. This method will work for the next 50 years and allows PIGBLUP to be used on existing data sets without conversion being necessary. A longer lasting change that will be effected before 2000 is outlined later.

On reading a data record, PIGBLUP expands the *ddmmyy* date field to the *ddmmyyyy* form for all internal processing. PIGBLUP's algorithms for calculating the days between two dates have been checked to see that the Gregorian calendar is observed - in particular, that the year 2000 is treated as a leap year.

2. *Gregorian Calendar*

The Gregorian calendar treats each year divisible by 4 as a leap year
unless the year is divisible by 100 - in which case it isn't,
unless it is divisible by 400 - in which case it is.

Thus 1996 and 2000 are a leap years but 1900 was not.

Checks the Have Been Made

The nature of the testing carried out to date has been to take a previously run data set, use the *dateshft* program to convert all date fields by adding a certain number of days (eg 2000 days) so that the data set spans the year 2000 (ie some dates in the 20th century and some in the 21 st century), re-running the analysis and checking that all output files are identical with those of the previous run. Obviously, it is necessary that the *Start Year* and *End of Analysis* Year are also correctly shifted by the same number of days.

3. *Sorting of Dates*

Because PIGBLUP uses the full *yyyy* form internally, sorting by date (in the form *yyyymmdd*) is handled correctly.

4. *Display and Reporting*

Dates are converted correctly for display.

Version 4.00 of PIGBLUP contains all the above changes and has been tested against existing data sets. Currently, there are no known bugs.

Changes Planned Prior to 2000

Some clients will prefer that their herd recording systems output date fields in the form *ddmmyyyy* and have PIGBLUP handle extracts correctly.

AGBU intends to create two new data formats - variants of the current 1.0 and 1.1 data formats - with full *ddmmyyyy* date fields. The Version 4.00 release will NOT provide these additional formats yet but the next release, well in advance of 2000, will do so. Clients will then be able to run existing data sets using the current formats or extract with full date fields and analyse correctly.

5. *A Fallback Method*

The *dateshft* program which will be packaged with the Version 4.00 release can be used as a date calculator and can be used by clients to perform their own checks should they desire.

In case the client's computer turns out not to be year 2000 compliant or a date-handling error slips through in PIGBLUP, the *dateshft* program can be used to continue running BLUP analyses until PIGBLUP is corrected.

This is done by using *dateshft* to convert a data extract by shifting all dates 'back in time by enough days that all dates lie in the 20th century.