

## New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website [www.nzsap.org.nz](http://www.nzsap.org.nz)

[View All Proceedings](#)

[Next Conference](#)

[Join NZSAP](#)

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](http://creativecommons.org/licenses/by-nc-nd/4.0/).



You are free to:

**Share**— copy and redistribute the material in any medium or format

Under the following terms:

**Attribution** — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

**NonCommercial** — You may not use the material for [commercial purposes](#).

**NoDerivatives** — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

<http://creativecommons.org.nz/licences/licences-explained/>

## The value of monozygotic twins in milk composition experiments.

M.J. AULDIST, T.R. MACKLE, R.J. HOOPER AND H.V. HENDERSON<sup>1</sup>

Dairying Research Corporation Ltd., Private Bag 3123, Hamilton.

### INTRODUCTION

Monozygotic (identical) twins have for many years been used to increase the statistical power of experiments in a range of scientific disciplines (Dick and Whittle, 1951). In dairy cows, variation within identical twinsets for a given biological parameter is usually substantially less than the variation between unrelated cows or between fraternal twinsets (Hancock 1953; Brumby and Hancock, 1956). Thus the number of identical twins required in an experiment is often considerably less than the number of unrelated cows necessary to achieve the same statistical precision. The experiments described here were conducted to quantify the twin efficiency values of a range of milk composition parameters.

### MATERIALS AND METHODS

Milk samples were collected from 20 multiparous Friesian twinsets (i.e. 40 cows) on 2 occasions during each of spring and summer 1994/95. Throughout the collection period, cows grazed the same pasture under common management conditions. Samples were chilled immediately following collection and subsequently analysed for concentrations of fat, protein, lactose, nitrogen (N) fractions (total N, non-protein N, non-casein N, casein N), fatty acid profiles and minerals. Intraclass correlations (the correlation within twinsets) and twin efficiency values ( $1/(1 - \text{intraclass correlation})$ ) were calculated for each parameter. Cows with mastitis were omitted from the analyses (2 cows only). Twin efficiency values estimate the number of unrelated cows required to achieve the same statistical power as one member of a twinset in a split-twin experiment.

### RESULTS

Depending on the parameter, intraclass correlation coefficients ranged from 0.49 to 0.97, corresponding to twin efficiencies of 2 to 36 (Table 1).

**TABLE 1:** Twin efficiency values for milk yield and selected milk components in spring and summer.

Component	Twin efficiency value	
	Spring	Summer
Milk yield	9	8
Fat	12	25
Fat yield	6	8
Protein	9	24
Lactose	10	22
Casein	8	13
Whey protein	3	4
Non-casein N	3	4
Non-protein N	2	6
Na	5	3
K	16	36
Fatty acid C16:0	7	5
Fatty acid C18:1	5	8

For some components, twin efficiency values were affected by time of season.

### DISCUSSION

The use of identical twins will enable a reduction in the number of cows used in experiments evaluating effects of farm practices on milk composition. This represents considerable savings in experimental costs, although the extent of the benefits may be dependent upon the time of year the experiments are conducted. It is important to acknowledge that the usefulness of twins is reduced in experiments where within cow comparisons are made (e.g. cross-over experiments).

### REFERENCES

- Brumby, P.J. and Hancock, J. (1956). *N.Z. J. Sci. Tech.* **38**: 184-193  
 Dick, I.D. and Whittle, P. (1951). *N.Z. J. Sci. Tech.* **33**: 145-172.  
 Hancock, J. (1953). *N.Z. J. Sci. Tech.* **35**: 189-198.

<sup>1</sup> AgResearch, Dairy Science, Private Bag 3123, Hamilton, New Zealand.