AIC (Akaike Information Criterion) – a screening method for various models. It is based on the likelihood estimate and is called a "penalized likelihood" where the penalty is a reduction in size based on the degrees of freedom.

Use of this criterion assumes that all candidate models are fitted to the same observations and the full likelihood is fitted to the same response (i.e. not to different transformation).

AIC – an asymptotically unbiased estimator

AIC = –2 (Mean Expected Log Likelihood} + 2K = 2K – 2 (Mean Expected Log Likelihood)
where K is the number of parameters fitted

Given an initial AIC_k value and a second AIC_0 derived for an "intercept only" model, then a pseudo R^2 can be calculated as $1 - (AIC_0 / AIC_k)$)

AICC (Akaike Information Criterion) – an empirical adjustment for smaller sample sizes that converges on the AIC as sample sizes increases. This model could be used for all cases.

AICC = AIC + (2k(k+1) / (n–k–1))

BIC (Bayesian Information Criterion or Schwarz BIC) – very similar to the AIC

AIC = –2 (Mean Expected Log Likelihood) + log(n)K
where K is the number of parameters fitted and n is the sample size

Testing for differences – in comparing two models, the difference in –2 (Log Likelihood) values follows a Chi square distribution. The degrees of freedom are equal to the difference in d.f. between the two models.

Fit statistics for the models in the milk protein example (n = 1337).

Model	-2RLL	AIC	AICC	BIC	Cov df.
Heterogeneous Toeplitz	-68.6	5.4	7.6	93	37
Toeplitz	9.9	47.9	48.6	93	19
Unstructured	-329	51	117.6	501.2	190
Variance Components, Heterogeneous Autoregressive	40.3	82.3	83	132	21
Ante-dependence	27.6	101.6	103.8	189.2	37
Variance Components, Spatial Power	107.2	113.2	113.2	120.3	3
Variance Components, Autoregressive	126.8	132.8	132.8	139.9	3
Heterogeneous Compound Symmetry	366.6	406.6	407.3	454	20
Compound Symmetry	427.5	431.5	431.5	436.3	2