

MSU Swine Resource Population

PhD work by David Edwards

National Swine Improvement Federation
Ames, Iowa
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MICHIGAN STATE

U N I V E R S I T Y

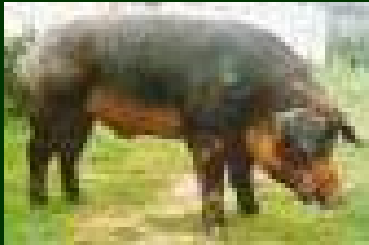
Overview

- Population description
- Traits collected
- Current objectives
 - Genome scan
 - Facility comparison



Duroc x Pietrain Resource Population

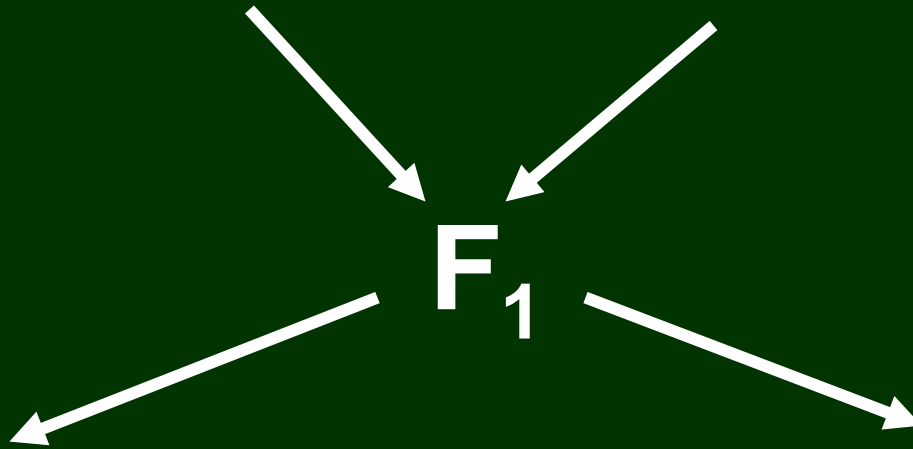
F_0



X



F_1



F_2



General Experimental Plan

- F₂ pigs were born in 11 different groups
- Data was collected frequently
- Pigs were slaughtered from 23-26 wk of age over three harvest dates per group



Live Measures

- Weights at birth, weaning (3 wks), 6 wks
- Weigh and scan at 10, 13, 16, 19, 22 wks
 - Tenth rib backfat
 - Loin eye area
 - Last rib backfat
- DNA collection from blood



Carcass Measurements

- Hot carcass weight, dressing %
- Temperature and pH at 45 min and 24 h
- Carcass length
- Midline backfat-1st rib, last rib, last lumbar
- Off midline tenth rib backfat and LEA
- Primal cut weights
 - Boston butt, picnic shoulder, loin, ham, belly, spareribs



Meat Quality Measurements

- Chops were cut and evaluated
 - Subjective color (1-6), marbling (1-10), firmness (1-5)
 - Objective color (CIE L*, a*, and b*)
 - Drip loss %



Meat Quality Measurements

- Loin section aged 7 days and frozen
- Cook yield and shear force
- Sensory panel
 - Juiciness, tenderness, off-flavor
- Proximate analysis
 - Protein, moisture, lipid, ash

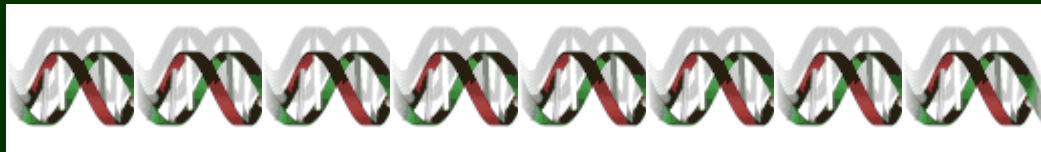
Final numbers

- 142 F₂ litters
- 1259 Birth Records
- ~62 Measurements per pig
- 959 pigs with growth and meat quality data
- Color pictures of ~500 F₂ pigs
- Completed in Feb. '04



Dissertation Objectives

- Genome scan for growth, carcass merit and meat quality (include ~62 traits)
 - 126 microsatellite markers
 - Validated for informativeness
 - Evaluating individuals in progress until Jan.
 - Will complete analysis at that time



Dissertation Objectives

- Evaluate differences caused by housing
 - Two separate finishers used for F_2 's
 - Some differences in management
- Random regression
 - Evaluate growth of animals of similar genetic merit in different facilities
- Serial estimates of heritability



Facility Comparison

- 986 animals into 1 of 2 finishers at 10 wk
 - Modified Open Front-six groups
 - 2/3 solid, 1/3 slatted floors
 - Wet-dry feeders
 - 12 or 16 pigs per pen
 - 1.42 m x 6.90 m or 2.03 m x 6.90 m
 - Test Station-five groups
 - Bedded, solid floors
 - Dry feeders
 - 4 pigs per pen
 - 1.42 m x 4.93 m



Facility Comparison

- Point estimate analysis
 - Fixed effects
 - Finisher
 - Gender
 - Random effects
 - Animal
 - Farrowing group or harvest group
 - Covariate
 - Age at measurement



Facility Comparison

- Random regression analysis
 - Fixed effects
 - Finisher
 - Gender
 - Measurement week
 - Interaction of finisher and week
 - Random effects
 - Animal
 - Farrowing group
 - Interaction of animal and week
 - Model heterogeneous variance
 - Model covariance
 - Animal intercept
 - Animal linear term



Facility Comparison

- Not different (MOF vs. TS)
 - Average Daily Gain (10 to 22 wk)
 - 898.5 vs. 888.9 g/d, $P = 0.48$
 - Loin muscle area at harvest
 - 37.7 vs. 36.3 cm², $P = 0.24$

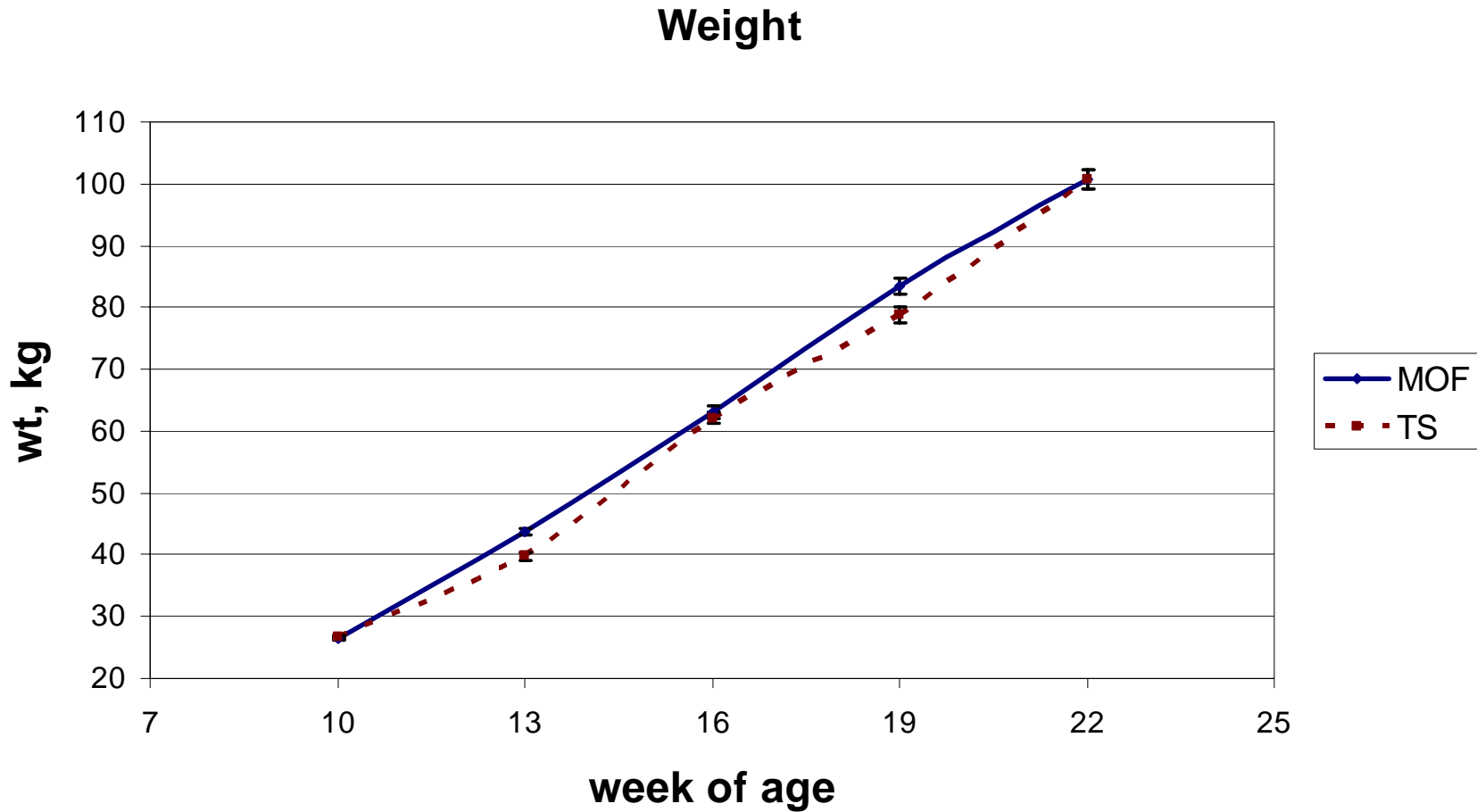


Facility Comparison

- Significant differences (MOF vs. TS)
 - Carcass tenth rib fat
 - 26.1 vs. 22.8 mm, $P = 0.04$
 - Carcass last rib fat
 - 30.2 vs. 26.9 mm, $P = 0.02$
 - Carcass last lumbar fat
 - 23.1 vs. 20.7 mm, $P = 0.05$



Facility Comparison

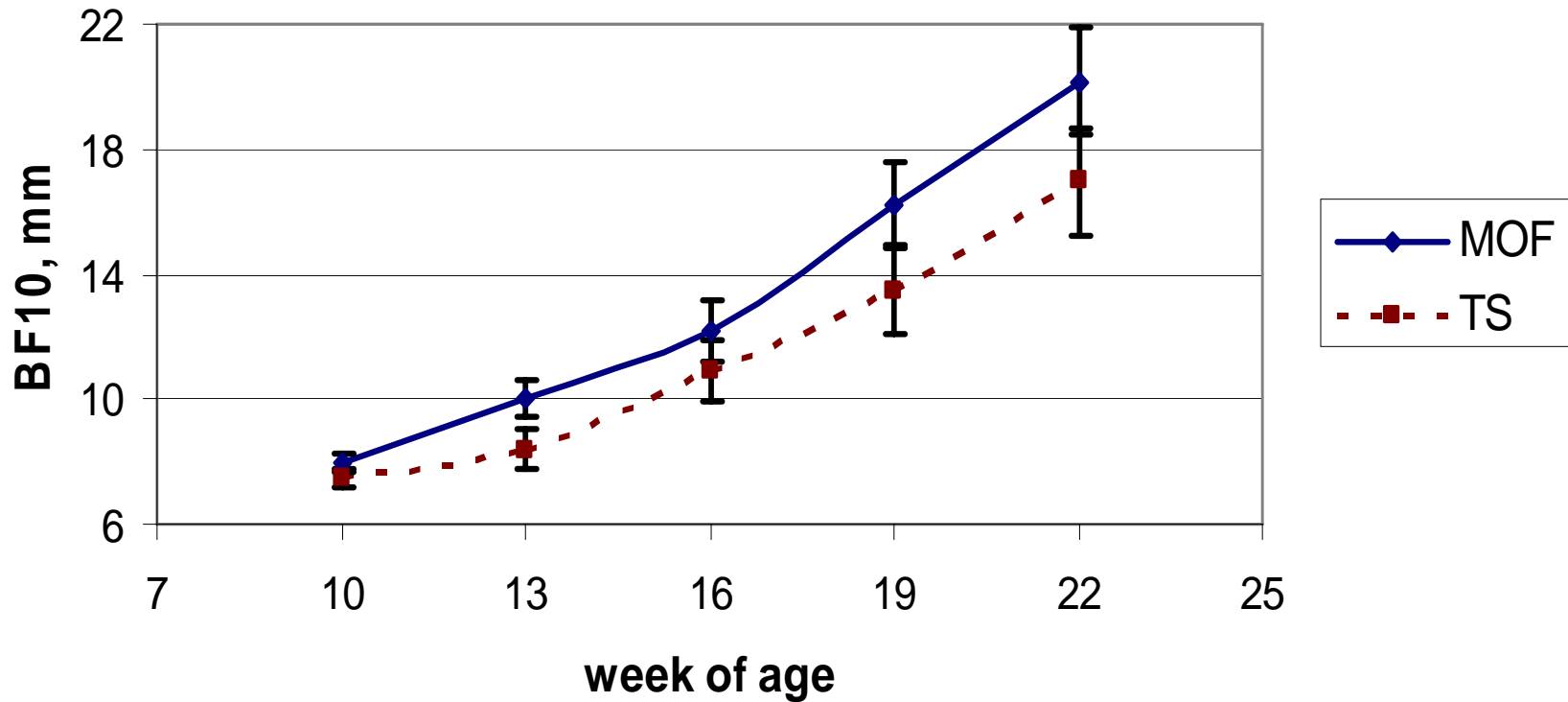


973 completed 22 wk



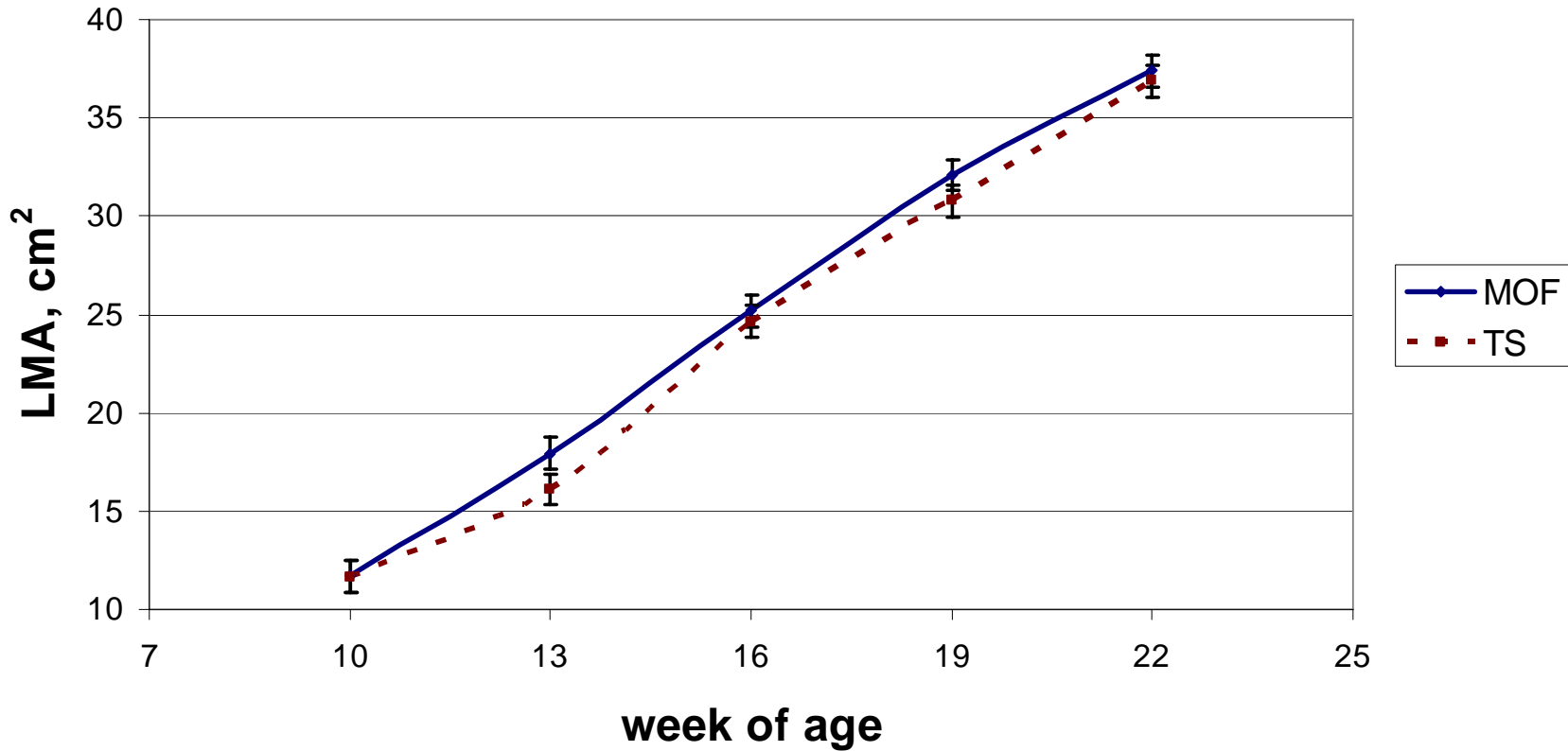
Facility Comparison

Tenth Rib Backfat

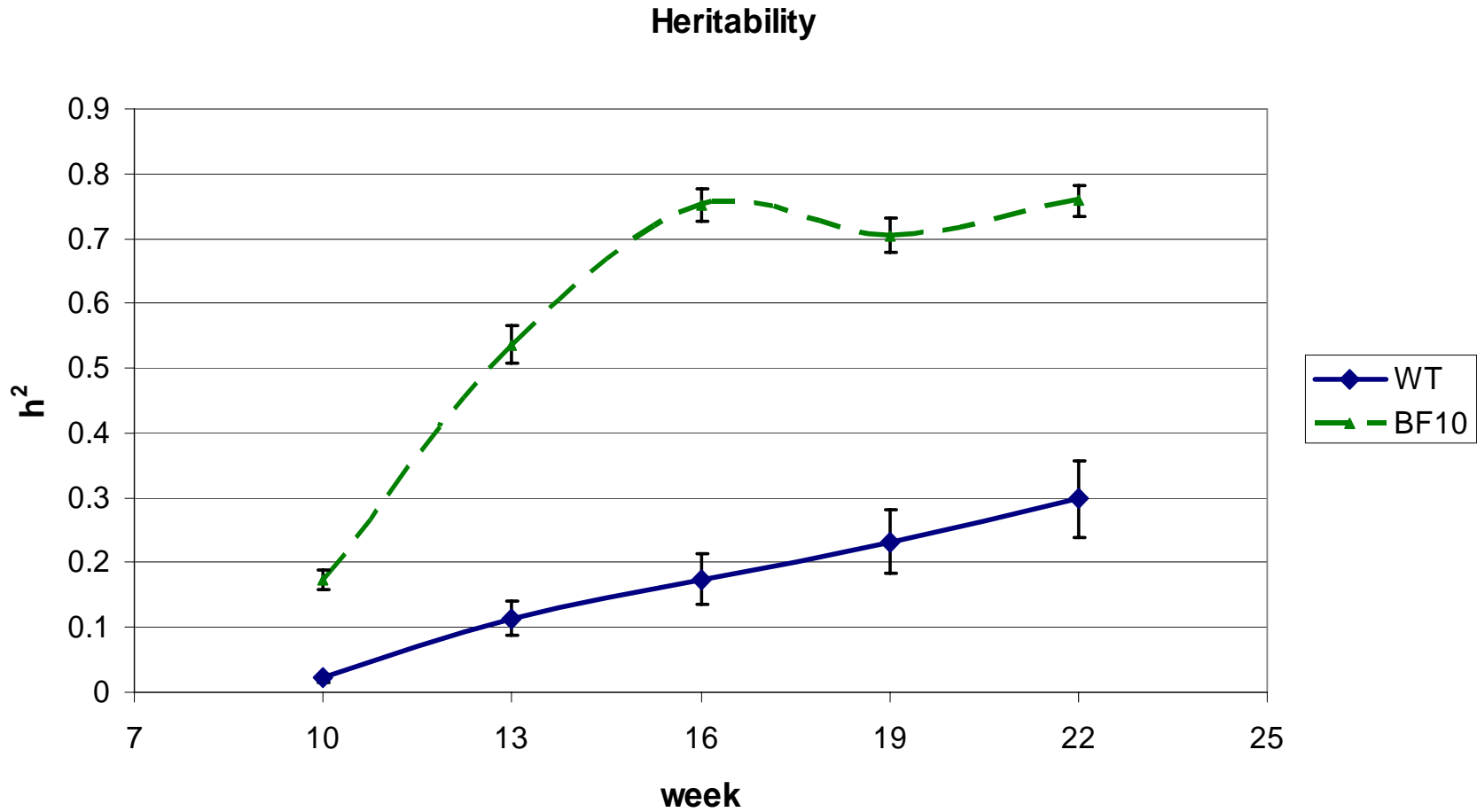


Facility Comparison

Loin Muscle Area



Facility Comparison



Facility Comparison

- No differences in meat quality traits
 - Primal cut weights
 - pH at 45 min and 24 h
 - Color, marbling, firmness, drip loss
- Temperature at 24 h did differ
 - 3.04 vs. 2.40 °C, $P = 0.05$



Implications & Future Direction

- Differences in growth patterns
 - Animals of similar genetic merit can have differences in growth
 - Feeding/management decisions
 - Information can be used to construct our models for use in genome scan



Personnel Involved

- Co-Investigators
 - C.W. Ernst, M.E. Doumit., R.O. Bates
- Collaborators
 - R.J. Tempelman, G.J.M. Rosa, W. Osburn
- Technical Staff and Students
 - N.E. Raney, E. Helman, M.D. Hoge, C.P. Allison, N. Berry, V. Rilington, K.-S. Kim, and many others



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